The *TRAFFIC Bulletin* is a publication of TRAFFIC, the wildlife trade monitoring network, which works to ensure that trade in wild plants and animals is not a threat to the conservation of nature. TRAFFIC is a joint programme of

WWF IUCN

The *TRAFFIC Bulletin* publishes information and original papers on the subject of trade in wild animals and plants, and strives to be a source of accurate and objective information.

Editor and Compiler *Kim Lochen*
Subscriptions *Susan Vivian*

Published by TRAFFIC International,
219c Huntingdon Road, Cambridge, Cambs.
CB3 0DL, UK.

ISSN 0267-4297
UK Registered Charity No. 1076722

Cover illustration of Japanese Eel *Anguilla japonica* (*Temminck & Schlegel (1846). Pisces, Fauna Japonica, Parts 10-14: 258. Pl. 13 (Fig. 1)*).
This page, from top:
Bear Paw Clam *Hippopus hippopus* (*B. Lynch, CITES Identification Manual*);
Japanese Eel (*as cover*); *Guaiacum* sp.

Funding for the printing and distribution of this issue of the *TRAFFIC Bulletin* is generously provided by The Rufford Foundation and The Ernest Kleinwort Charitable Trust.

Printed on recycled paper by The Burlington Press (Cambridge) Ltd, Station Road, Foxton, Cambridge, UK.

TRAFFIC

BULLETIN

VOL. 19 NO. 2

November 2002

EDITORIAL

The 12th meeting of the Conference of the Parties to CITES (CoP12) in November in Santiago will once again put wildlife trade in the international spotlight - highlighting to a world audience the threat that unsustainable trade in wild animal and plant species can pose to their survival. However, it is often forgotten that the over-harvesting, unsustainable use and illegal trade of wildlife species threatens not only their continued survival but also the livelihoods of local communities and local economies that depend upon these species.

Wild plants and animals have been and continue to be a critical source of food and income for a wide range of communities and societies - from traditional hunter gatherers and small fishing communities to large multinational companies and consumers in urban centres across the globe. While wildlife represents the only viable source of food in some communities, in others food harvested from nature has formed the basis for large industries. The economic survival of many fishing communities depends upon healthy stocks of these same fish which form the basis of large-scale fisheries that contribute greatly to national economies. However, such stocks are now facing intense pressure from excessive harvests and illegal, unreported and unregulated (IUU) fishing. For example, even a conservative estimate by TRAFFIC puts the IUU catch for Patagonian Toothfish as accounting for half of the specimens traded in 2000 - completely undermining the effectiveness of international conservation efforts and management regimes for the species.

Forests are another important resource for many national economies. However, governments are experiencing dwindling foreign currency exchange and tax revenues due to the illegal timber trade: businesses lose millions of dollars to illegal logging operations and the livelihoods of many local communities that depend upon these natural resources for employment and income are being threatened. Growing international demand, and prices for certain high-value timber species especially, are encouraging individuals to find even more ways to evade national forest controls. The effectiveness of these controls is further diminished by the financial, logistical and human resource limitations faced by the authorities tasked to implement and enforce them.

It is evident that much more needs to be done in areas such as fisheries and timber. With proposals to include a number of commercial fisheries species and a commercial timber species in Appendix II at the coming CoP, there is a golden opportunity for CITES Parties to meet this challenge - not only to empower CITES to play a more positive role in the management of our planet's natural resources but also to expand the scope and flexibility of the treaty, thereby strengthening its effectiveness.

However, Parties need to move beyond an "endangered species" approach when addressing trade in these species. The focus should not only be on the continued survival of the species but also on ensuring their security as wild resources that meet food, economic and other human needs. The approach will need a great deal of innovation and flexibility from CITES, allowing it to transcend its traditional role as a last-resort regulatory tool and become part of a more integrated management effort - providing Parties the processes and mechanisms necessary to complement and strengthen their own national policies and legislation.

Such an approach will also test CITES' ability and flexibility to interact, co-operate and integrate with the wide range of other multilateral environmental agreements that regulate and manage the harvest and use of wild resources. CITES will need to demonstrate that it not only has the potential to support other management regimes in meeting their objectives, but also be an effective safety net for some species when these management regimes cannot address their sustainable use and conservation effectively.

However, perhaps the greatest challenge in promoting the use of CITES in managing the sustainable use of wildlife resources is the misconception that CITES listings will always lead to trade bans. CITES is an international trade mechanism capable of helping to address concerns such as illegal harvesting and trade and unsustainable management, and not just a means to stop international trade when other conservation efforts have failed. Appendix II provisions, indeed, facilitate the controls, processes, tools and information that will assist countries in managing their natural resources so that species' populations do not reach the point where trade bans could be the only management option left. CITES has recognized that sustainable trade can itself contribute to the survival of a species by providing value and therefore economic incentives to ensure its continued existence. Parties will need to embrace this lofty ideal if they are indeed to rise to the challenge.

Sabri Zain, *Advocacy and Campaigns Director, TRAFFIC International*

CITES PARTIES

The number of Parties to CITES has increased to 160: Lithuania's accession came into force on 9 March 2002; Ireland ratified CITES on 8 January 2002 (effective 8 April 2002), followed, on 12 August, by Kuwait (effective 10 November 2002); on 15 August, Bhutan acceded to the Convention (effective 13 November 2002).

CITES Secretariat, 3/11 January; 21 August 2002
www.cites.org/eng/news/party

STAFF

JAMES COMPTON took up the position of Director at TRAFFIC Southeast Asia, based in Malaysia, in July 2002. James joined TRAFFIC in 1999 as head of the Indochina office of TRAFFIC Southeast Asia, followed by a two-year period as Senior Programme Officer at TRAFFIC Oceania.

CHRISTOPHER ROBBINS and PETER PAUL VAN DIJK, Senior Programme Officers at TRAFFIC North America and TRAFFIC Southeast Asia, respectively, have left their positions but continue to collaborate with TRAFFIC in a consulting capacity.

bulletin board

XU HONGFA was appointed China Wildlife Trade Programme Co-ordinator in December 2001. This TRAFFIC East Asia position is established within WWF China based in Beijing. Professor Xu was Dean of Chemistry and Life Science College at East China Normal University in Shanghai and currently maintains his position as Director of the Shanghai Wildlife Forensic Laboratory. His research interest area is small deer, such as Chinese Water Deer and Musk Deer, and teaching Animal Ecology.

MARCUS PHIPPS joined TRAFFIC International in August 2002 as the network's Director of Operations. Marcus started working with TRAFFIC at the beginning of 1995 as head of the Taiwan office of TRAFFIC East Asia. He became Deputy Director of TRAFFIC East Asia in 1998 and worked as Acting Regional Director during 2000. Over the last year he has been working again as Deputy Director in Hong Kong, while helping TRAFFIC International with the network's finance systems capacity-building project. Marcus's new role will cover a range of finance and administrative management issues - a new post at TRAFFIC International that should greatly strengthen the network's institutional capacity.

traffic websites

http://www.traffic.org
http://www.twics.com/~traffic j
http://www.deol.ru/nature/protect
http://www.wow.org.tw

Text of this issue of the *TRAFFIC Bulletin* is available on http://www.traffic.org

TRAFFIC OFFICES

A new arm of the TRAFFIC network has been set up in Hungary, hosted by WWF Hungary. With effect from October 2002, ATTILA STEINER will be responsible for the TRAFFIC Europe-Candidate Countries Programme based in Budapest. Work will focus on five of the 13 countries that are likely to accede to the European Union in the near future: the Czech Republic, Hungary, Poland, Slovakia and Slovenia. Assistance will be given to the relevant authorities with the implementation and enforcement of CITES and in the preparation of the EU accession with regard to implementation of regulations *(EC) No. 338/97* and *1808/2001,* which form the legal basis of CITES provisions in all EU Member States and which automatically apply once a country has joined the EU. Further duties of the office will be directed at building institutional capacities, an adequate and effective administrative framework and in providing technical advice and expertise to ensure that these Candidate Countries are assisted in their efforts to reduce illegal wildlife trade along their borders.

Attila graduated from the University of Veterinary Science in Budapest. Prior to joining TRAFFIC, he worked for WWF Hungary where he was responsible for designing conservation projects focusing on river and forest management.

The establishment of this programme office has been made possible through the financial support of the Austrian Government, WWF Austria and TRAFFIC Europe.

WWF Sweden will host a new TRAFFIC Europe national office near Stockholm. The office will be staffed by MATS FORSLUND, who has, since the late 1980s, been investigating the illegal wildlife trade in Sweden, particularly the wild bird trade, on behalf of WWF-Sweden. Mats will now spend 80% of his time for TRAFFIC examining trade concerns in Sweden and in other Nordic countries. This development is linked to a new funding arrangement affecting the TRAFFIC network as a whole. Through the hard work of WWF Sweden, TRAFFIC has been included as one of the beneficiaries of a new three-year funding package from the Swedish Government development agency - SIDA. Together with a new pledge of additional direct support from WWF Sweden over the next three years, the SIDA money will support policy and programme work of TRAFFIC offices in Southeast Asia, East Asia, East/Southern Africa and Sweden to the tune of over one million Swedish Krona (USD107 000) a year.

Michael Meacher, UK Environment Minister (right) > with John Abbott, Director General of NCIS.

JAMMU AND KASHMIR BANS THE MANUFACTURE OF SHAHTOOSH

In an historic move, the Government of the State of Jammu and Kashmir (J&K) has banned the manufacture of shawls woven from the wool of the Tibetan Antelope (Chiru) *Pantholops hodgsonii*. Previously listed in Schedule II of the *J&K Wildlife (Protection) Act*, which made trade or use of derivatives of specimens of this species possible under licence, on 6 May 2002 the J&K Assembly promulgated an amendment to place the Chiru in Schedule I of the Act, giving it the highest level of protection and making any use of its derivatives punishable by law. The Tibetan Antelope is listed in CITES Appendix I, making international trade illegal, and is given the highest level of protection by the laws of China, Nepal and India.

Information collected by a TRAFFIC consultant in August 2002 in Jammu, and in Leh, Ladakh, showed that there has been an overall decline in the manufacture and trade in shahtoosh shawls in recent years. Forest and Wildlife Department officials stated that very few weavers continue to use shahtoosh and that whatever shawls still found were from wool derived from old stock. At Leh, a key trading centre in Ladakh, pashmina shawls (made with wool from a domestic goat) were being offered but no shahtoosh was advertised. When the shop owners were asked about shahtoosh, they pointed out that the trade was illegal, although, when pressed admitted that it had been very popular and lucrative owing to the high price of shahtoosh but fear of arrest and imprisonment meant that people were now afraid to trade in this commodity. They did admit that some shahtoosh wool is still reaching the manufacturers in Srinagar in the Kashmir Valley, however, and that clandestine manufacture of shawls is carried out opportunistically.

Information compiled by TRAFFIC, with the assistance of an undercover operator, shows that 106 shahtoosh shawls and 177 kg of shahtoosh wool have been seized in India and Nepal during the first six months of 2002 and that eight people were arrested. Further, reliable official sources have divulged that a six-to-seven pony-load of shahtoosh entered India across the Indo-Tibet border in Ladakh in July, which, despite advance information, could not be apprehended. It has since been reported to have reached Srinagar. Evidence that shahtoosh wool continues to be smuggled into India from across the border with Tibet makes the traders' reports of clandestine manufacture of shahtoosh shawls in Srinagar entirely plausible.

A more detailed review of the shahtoosh trade is forthcoming.

TRAFFIC International; Wildlife Trust of India 2002. http://www.wildlifetrustofindia.org

Launch of UK National Wildlife Crime Intelligence Unit

The illegal trade of rare species is amongst the most lucrative criminal trades in the world and in common with other areas of organized crime, is transnational. In order to help in the fight against wildlife crime, in April 2002 the UK Environment Minister Michael Meacher formally launched the National Wildlife Crime Intelligence Unit (NWCIU) in London. The unit will provide law enforcement with intelligence to target and disrupt these crimes and the criminals involved. The Unit is part of the Specialist Intelligence Branch in the UK Tactical Services Division of the National Criminal Intelligence Service (NCIS) and is funded by the Department for Environment, Food and Rural Affairs (DEFRA), the Association of Chief Police Officers, the Home Office and the Scottish Executive.

The overall strategic direction of the Unit and its priorities will be guided by the Partnership for Action Against Wildlife Crime (PAW) through a foundation group. PAW is a multi-agency body comprising representatives of all organizations involved in wildlife law enforcement in the UK. PAW is run by DEFRA and was instrumental in the creation and establishment of the Unit.

The NWCIU will serve as a national focal point for gathering, analysing and disseminating intelligence on serious wildlife crime on a regional, national and international level. As well as establishing links to other serious crime and developing sources of intelligence gathering, the Unit will identify trends and patterns in wildlife crime and provide a nucleus of expertise and knowledge on the subject. Links with domestic and international agencies dealing with wildlife crime will also be established.

Chris Kerr has been appointed head of the Unit. He is on secondment to NCIS from Cleveland Police and has spent 10 of his 16 years in police service as a Police Wildlife Liaison Officer. He says:

'From the outset the Unit will have a flexible remit, though our work will be fairly specific in conducting enquiries involving the illegal international trade in endangered species. It will also target those individuals involved in serious and organized native wildlife crime. The Unit aims to act as a focal point for wildlife crime issues, and in time will become a vast advice and contact base.'

TRAFFIC is collaborating closely with the NWCIU and supporting the unit's work whenever possible. Chris Kerr can be contacted at NWCIU, NCIS, PO Box 8000, London SE11 5EN. Tel: 0207 238 8367; E-mail: kerrc@ncis.x.gsi.gov.uk

Stephanie Pendry,
UK Enforcement Assistance Officer, TRAFFIC International

From 12 to 16 February 2002, Bremen, Germany, hosted the eighth session of the **Sub-Committee on Fish Trade of the Fisheries Committee of FAO** (Food Agriculture Organisation of the United Nations). Two subjects on the agenda related directly to CITES: an analysis of CITES listing criteria as applied to commercially-exploited aquatic species and the development of a work plan for exploring CITES issues with respect to the international fish trade.

With regard to the CITES listing criteria (revision of Resolution Conf. 9.24), the Sub-Committee endorsed the report from the FAO Second Technical Consultation (Namibia, November 2001) as a package, including proposals on changes to the criteria, the emphasis on using the best scientific information available, the need for a strengthened scientific evaluation process and an analysis of proposals on a case-by-case basis. Particular concern was raised by some delegates about the difficulty in de-listing a species even when good scientific support was provided in such a proposal. Also, several countries expressed their reservations about the role of CITES in relation to commercial exploitation of resources by fisheries, indicating that confusion remains in the fisheries arena about the main focus of CITES, namely, a better regulation of trade in natural resources. Malan Lindeque, representative of the CITES Secretariat, stressed the importance of active communication between national agencies, such as the Ministries of Fisheries or Agriculture, Environment or Forestry, in order to improve understanding of the mechanisms and goals of the Convention.

The second relevant agenda item, development of a workplan, included two main issues: the examination of CITES provisions from an international fish trade angle, and possible procedures to enhance the current process for scientific evaluation of species-listing proposals, particularly for species subject to commercial fisheries. Regarding the former, selected CITES provisions were: the look-alike clause (Art. II, paragraph 2b), split-listing, introduction from the sea, and the relationship between CITES and other international instruments, such as UNCLOS (United Nations Conference on the Law of the Sea). Additionally, it was recognized that many possible implications of a CITES listing, such as the administrative burden and socio-economic consequences, had not yet been explored and that FAO needed to investigate further, for instance by initiating case studies on species that could potentially be proposed. At the end of the meeting, the Sub-Committee was in a position to forward agreed recommendations to COFI (Committee on Fisheries of FAO) at its next meeting in early 2003.

TRAFFIC attended the meeting as part of the IUCN delegation and provided delegates with a briefing paper jointly prepared with IUCN and WWF on the complementary role of CITES in the fish trade which, amongst other things, explained the wide scope of the Convention, both geographically (more than 150 Parties) and biologically (all species, including invertebrates and taxa involved in small-scale fisheries), its role in efforts to combat trade in products from illegal, unregulated and unreported (IUU) fisheries, and tried to answer certain misconceptions such as the potential conflict between CITES and fisheries management measures. The outcome of the event provides concrete guidelines for formal collaboration between FAO and CITES which TRAFFIC believes represent an important step forward to fill the gaps between fisheries, trade and conservation measures.

One item was indirectly related to CITES, and dealt with the Feasibility and Practicability of Harmonizing Catch Documentation used by Regional Fishery Bodies in Relation to Trade. The document submitted to the Sub-Committee was prepared at the Expert Consultation of the Regional Fisheries Management Bodies on the Harmonization of Catch Certification, held in January 2002, in La Jolla, California. The majority of delegates expressed negative opinions on its content, highlighting, in particular, the need for RFMOs (Regional Fisheries Management Organisations) to endorse the document before it is submitted to COFI and clarification about the species of fish to which the proposed documentation could apply in the future. Unfortunately, the next consultation meeting of all RFMO secretariats is scheduled to be held in February 2003, one week after COFI, which means that the submission of the concept has to be postponed until the 2005 COFI meeting.

Caroline Raymakers, *Director, TRAFFIC Europe*

Indian Ocean coastal States face significant threats to marine resources within their Exclusive Economic Zones (EEZ), particularly through the activities of illegal, unregulated and unreported (IUU) fishing vessels. A lack of capacity and resources hampers the ability of the majority of affected States in carrying out effective controls at sea and port States, and the overharvesting of marine resources has clear conservation and food security implications for the region. With this in mind, a **Workshop on Marine Enforcement in the Indian Ocean** was held in Port Louis, Mauritius, from 8 to 12 April 2002. The workshop was organized by the US embassy in Ethiopia through funding from the US State Department.

Over 40 delegates from Indian Ocean coastal States, inter-governmental organizations, regional fisheries management organizations and non-governmental organizations, including TRAFFIC East/Southern Africa, attended the workshop. In addition, representatives from the United States National Oceanographic and Atmospheric Administration (NOAA), the US Coast Guard, and the US National Marine Fisheries Service (NMFS) formed a core group of presenters. The focus of the workshop lay in facilitating collaboration between Indian Ocean Coastal States on monitoring, surveillance and compliance related to marine fisheries, as well as building capacity on onshore enforcement regimes and providing information on the use of market-state measures in addressing IUU fishing.

The workshop offered TRAFFIC the opportunity to provide an overview of its work on Indian Ocean marine species as well as provide expertise on issues such as CITES and commercial marine fisheries.

Presentations by the various country delegates provided significant insight into the capacity of these countries to effectively regulate marine fisheries within their EEZs, with a clear trend towards a lack of capacity and resources. Various enforcement techniques were discussed, as were the differences in sanction provisions related to the infringement of fisheries regulations.

Representatives from NOAA and NMFS emphasized the role that market States can play in tackling IUU fishing through the use of trade-related measures and specific tools such as the US Lacy Act. Such approaches are particularly relevant to Indian Ocean coastal States that for the most part lack the necessary at-sea enforcement capacity to address IUU fishing at the harvest stage. While the important role of consumer states in addressing IUU fishing was recognized, it was clear that a comprehensive approach to IUU fishing is required and coastal States must accordingly enhance their monitoring, surveillance and compliance capacity towards boosting flag and port-state controls. In light of the budgetary and capacity constraints facing the majority of countries present, it was recognized that the most significant advances will be achieved through information sharing, greater collaboration on enforcement activities and through the alignment of national legislation.

Much interest was expressed in TRAFFIC's work and it is clear that the regional programme has a role to play in working towards sustainable fisheries in the Indian Ocean through information provision, capacity-building and facilitating collaboration amongst Indian Ocean coastal States.

Markus Burgener, *Programme Officer, TRAFFIC East/Southern Africa*

The East Asian region has a great variety of fisheries items on the market. These goods can be identified from information on the packaging, in most cases in the form of labels, which, in Japan, by law, must show that the item meets the Japanese Agricultural Standard (JAS). Japan's **Quality Labelling Standards** provide quality control for processed foods, as well as wood material for construction, for example, and are based on the provisions set out in the *Law for Standardization and Rationalization of Label of Quality of Products of Agriculture and Forestry*. Originally established out of concern for the health and well-being of consumers, it allows customers to make informed decisions about the products they buy. Amendment to the law in 1999 included the requirement on labels for all unprocessed fresh fish, such as whole fish or filleted fish (for example, sashimi), for the inclusion of the source of the fish and location of the sale (Figure 1).

Further, processed fish products are now subject to the same system: salted and dried wakame seaweed *Undaria pinnatifida*, prepared broiled eel (*kabayaki*), dried and salt-dried fish and dried fish chips. Unfortunately, however, the labelling system does not work so well for foods, in particular for fish products, owing to the large number and variety of fish products available from many localities in Japan; items are sometimes sold with fake labels or even without labels, in order to justify higher prices. The system is now being revised in order to try to avoid this problem and the most recent amendment to the law has been the introduction of higher penalties.

Accurate labelling of fresh fish and related products could be of considerable conservation value in the future. Further information on Japan's labelling system is available in English at the website of Japan's Ministry of Agriculture, Forestry and Fisheries: http://www.maff.go.jp/soshiki/syokuhin/hinshitu/organic/eng_yuki_top.htm

Fumihito Muto, *Regional Fisheries Officer, TRAFFIC East Asia*

ERRATUM

In the Acknowledgements section of the Patagonian Toothfish article (Volume 19 No. 1), it states that Santiago Contreras is a member of ECOCEANOS. Mr Contreras is not associated with that organization and we apologize for this error. (ed.)

Figure 1 (left). Japanese supermarket fresh fish food label following the JAS labelling system [Southern Bluefin Tuna (lean meat), [from Spain], [Cultured/ Defrosted/ for Sashimi], Date of Processing, Best-before Date, Price/100g, Contents (g), Total Price, Name and Address of Shop. In this case, this label follows JAS requirements, although, if the fish is from Spain, it is likely to be Northern Bluefin Tuna. Photo right: filleting a Northern Bluefin Tuna, Spain.

g. 2. Example of fresh fish food label, following JAS system. From a supermarke
ontents: Southern Bluefin Tuna (lean meat), [from Spain], [Cultured/ Defrosted/ fo
ate of Processing, Best-before Date, Price /100g, Contents (g), Total Price, Name a
Shop. In this case, this label well follows JAS requirements, but the combinatio
me and locality is impossible.

Maputo's Ivory Markets, Mozambique

BACKGROUND

The African Elephant *Loxodonta africana* is listed in CITES Appendix I and as such all commercial international trade in ivory or other elephant products has been prohibited since January 1990[1]. The elephant population of Mozambique, a Party to CITES since 1981, was recently estimated at between 6900 to 13 400 animals (Barnes *et al.*, 1999). Although the killing and trade in elephants and elephant products in Mozambique is understood to be illegal, a legal avenue for trade in worked ivory products remains (Martin and Stiles, 2000). Furthermore, an export quota for 20 sport-hunted tusks a year has been allowed under CITES (Anon., 2002). However, the process through which raw ivory from illegal sources can become worked ivory products that are legal remains to be described and documented. As such, national legislation governing the protection of elephants and trade in elephant products, especially ivory, needs urgent clarification from the government, and any existing loopholes need to be addressed. Against this backdrop, various observers have noted the continuing trade in ivory from Mozambique, including a major study (Martin and Stiles, 2000).

Since 1996, Mozambique has participated in all of the African Elephant Range State Dialogue meetings, all meetings of the Conference of the Parties to CITES, as well as various regional meetings to facilitate the implementation of the CITES monitoring system for elephants in the wild, known as MIKE (Monitoring the Illegal Killing of Elephants). In the context of ETIS (Elephant Trade Information System), the CITES monitoring system designed to track illegal trade in elephant products globally, Mozambique has also received two ETIS Country Reports from the CITES Secretariat. These contained all data relevant to ivory and elephant product seizures anywhere in the world which relate to Mozambique. Pursuant to Decision 10.2 (Conditions for the disposal of ivory stocks and generating resources for conservation in African Elephant range States), in September 1997, Mozambique declared a total of 266 ivory tusks, weighing 1846.80 kg, which were held in five locations in the country (Cabo Delgado, Manica, Maputo, Niassa and Tete). These stocks were audited and certified to represent 269 ivory tusks, weighing 1840.40 kg. To date, these stocks have not been purchased by a donor pursuant to the Decision 11.3 *(ex-10.2*) process.

OBSERVATIONS

In order to ascertain how much ivory is being offered for sale in Maputo, a spot check on the domestic ivory market in the nation's capital was conducted on 22 April 2002, with funding provided through a grant from WWF. The following locations were surveyed:

Pavement market: Avenue 24 de Julho/Julius Nyerere contained the largest concentration of ivory products for sale in Maputo. About a third (seven or eight) of the 20 to 25 vendors in this market featured approximately 300 ivory products, including ivory/wood composite pieces, earrings, key chains, letter openers, spoons, pipes and crucifixes, as well as numerous necklaces and boxes made from hardwood, ivory and CITES Appendix I-listed Hawksbill Turtle *Eretmochelys imbricata* shell (known as tortoiseshell). A small sample of other examples are included in Table 1. Some vendors identified their ivory as coming from Pemba in the north of the country and, when questioned, stated that ivory was allowed to be taken abroad.

Description of item	Prices: Meticais (MT)	US dollars
Fruit carvings (15 cm x 10 pieces)	12 000 000	500
Necklaces of beads	350 000-900 000	14.58-37.50
Bangles	200 000-500 000	8.33-20.83
Small animal carvings (10 cm)	300 000-400 000	12.50-16.67
Large Makonde-style (35 cm) carvings	3 500 000	145.83
Carved tusks (50 cm x 2 pieces)	10 000 000	416
Butter knives (9 cm x 6 pieces)	500 000	20.83

Table 1. Ivory products and prices at the Avenue 24 de Julho/Julius Nyerere market, April 2002. *Exchange rate: MT24 000 = USD1*

Pavement market: *Hotel Polana:* only a few ivory products were offered by a couple of vendors at the extensive open-air market stretching along the street in front of the hotel. These included two ivory carvings that were 15-20 cm in height and priced at USD350 for the pair. Two 6 cm well-carved ivory busts were priced at MT600 000 (USD25) each, and a slightly larger ivory bust was offered at MT800 000 (USD33). The detail on these busts was among the best observed of the ivory carvings found in Maputo.

Pavement market: *Hotel Cardosa:* about half of the six or seven curio vendors present in front of the hotel displayed ivory products. These included over 20 ivory bangles, and at least 50 other ivory products, including necklaces, butter knives, earrings, and composite ivory/wood boxes. Two well-carved 35-40 cm crocodile figures were priced at USD350 each.

Mercado Central: three shops in the souvenir section of this large, covered market had small volumes of ivory jewellery - mostly bangles, necklaces and earrings. All items were fairly standard productions and the prices were in line with those stated for similar items in Table 1. Elephant hair bracelets, tortoiseshell bangles and necklaces were available, as well as a tortoiseshell and ivory box for USD40. Giraffe tail hair also featured in the construction of other necklaces. The shopkeeper indicated that the ivory had been obtained from Pemba and from Mozambique Island in the north. Another shop reportedly had some ivory products, but it was closed at the time of the survey.

Shopping Arcade: *Hotel Rovuma Carlton:* the upmarket African curio shop *Galeria Rovuma* featured a number of well-crafted ivory products, including fairly large ivory and tortoiseshell boxes for USD280 and some small ivory figurines. Prices were given in US dollars and were expensive when compared to ivory sold through the open-air markets. Another shop *Mahipe Optical* also featured various items of ivory jewellery and a small ivory and tortoiseshell box for USD40.

Shopping Arcade: *Hotel Polana:* an outlet of the shop *Galeria Rovuma* sold two ivory and tortoiseshell boxes for USD290 each and a pair of polished 33 cm ivory tusks for USD290.

[1]*The populations of Botswana, Namibia, South Africa and Zimbabwe were transferred back to Appendix II, under a set of conditions, at the 10th and 11th meetings of the Conference of the Parties to CITES.*

Airport duty-free shops: the *Moçambique Arte & Gift Shop* in the international departure lounge featured 139 ivory items and 6 elephant hair bracelets for sale. All prices were in US dollars. Table 2 is indicative of the items and prices observed in this shop. The prices were comparatively higher than those found elsewhere in the city, in spite of the fact that items were duty-free. Potential customers were all destined to fly out of Mozambique to regional or international destinations. CITES documentation was not available and all sales from this outlet are believed to represent a major trade infraction under the Convention. The presence of ivory products in this location has been brought to the attention of CITES Management Authority officials in Mozambique on various occasions in the past, some as early as 1993. No attempt over the following years has apparently been made to curtail this trade. It should also be noted that another outlet of this shop in the check-in area of the airport featured ivory products but the volume was much less than that observed in its shop in the departure lounge.

CONCLUSIONS

This survey was only conducted in Maputo and was by no means exhaustive. TRAFFIC has received other reports of ivory products being sold in tourist curio markets and in hotels in the cities of Beira, Vilanculos and Pemba. It appears that Mozambique allows a domestic trade in ivory to flourish in complete disregard of CITES and with little interference from the government. Resolution Conf. 10.10 (Rev.), initially adopted by the tenth meeting of the Conference of the Parties, in June 1997, stipulates conditions for the allowance of domestic trade in ivory.

The statement:

RECOMMENDS to those Parties in whose jurisdiction there is an ivory carving industry that is not yet structured, organized or controlled and to those Parties designated as ivory importing countries, that comprehensive internal legislative, regulatory and enforcement measures be adopted to:

a) register or license all importers, manufacturers, wholesalers and retailers dealing in raw, semi-worked or worked ivory products; and

b) introduce recording and inspection procedures to enable the Management Authority and other appropriate government agencies to monitor the flow of ivory within the State, particularly by means of:

i) compulsory trade controls over raw ivory; and

ii) a comprehensive and demonstrably effective reporting and enforcement system for worked ivory.

Item	US dollars
Necklaces	43
Rings	3-10
Carved eggs	95
Small carved animals	23-35
Small carved figurines	Up to 100
Larger carved figurines	350
Letter openers	15
Spoons/forks	10
Bracelets	35
Cigarette holders	15
Crucifixes	65

Table 2. Ivory products and prices at Maputo Airport departure lounge, April 2002.

There is little indication that these provisions are being met with respect to the domestic trade in ivory products in Mozambique. Further, the apparent sanction of an ivory outlet in the departure lounge of Maputo's international airport stands as a clear violation of the spirit and substance of CITES. There is little doubt that government officials charged with CITES implementation in the country cannot help but notice this trade during their travels in and out of the capital city.

Finally, it is worth noting that Mozambique's participation in the CITES monitoring systems for trade in elephant products is also weak. Resolution Conf. 10.10 (Rev.) instructs all Parties to submit data on seizures of ivory or elephant products to the CITES Secretariat or TRAFFIC, for input into ETIS, within 90 days of their occurrence. It is also noteworthy that, to date, Mozambique has never officially submitted any information to ETIS. However, ETIS currently contains 34 cases relating to ivory seizures that have been reported by other countries but for which Mozambique is identified as either the source of the ivory, or the country of export, import, or transit, or where nationals of Mozambique have been arrested in conjunction with a seizure.

In conclusion, within southern Africa, Mozambique arguably allows the largest market for unregulated domestic ivory in the region. This fact cannot be overlooked and will be noted in the TRAFFIC report to the 12th meeting of the Conference of the Parties to CITES to be held in November 2002.

RECOMMENDATIONS

- Mozambique needs to clarify its domestic legislation relating to trade in ivory and other elephant products, and its compliance with the provisions for the regulation of domestic ivory markets in Resolution Conf. 10.10 (Rev.) of CITES. Loopholes that currently allow unregulated, unreported and illegal trade in ivory and other elephant products need to be urgently addressed.

- Any trade in ivory products sold at the departure lounge of Maputo international airport constitutes international trade and is consequently a violation of CITES. The government should take measures to curtail such trade immediately, and the CITES Standing Committee should track future developments in this regard to ensure that appropriate action is taken in the interim between the meetings of the Conference of the Parties.

- With regard to participation in ETIS, government authorities should take immediate steps to ensure that any seizures of ivory or elephant products which have taken place in Mozambique since June 1997 are reported to the CITES Secretariat or TRAFFIC.

REFERENCES

Anon. (2002). CITES Notifications to the Parties, 2002/011. CITES Secretariat, Geneva, Switzerland.

Barnes, R.F.W., Craig, G.C., Dublin, H.T., Overton, G., Simons, W. and Thouless, C.R. (1999). *African Elephant Database 1998*. IUCN/SSC African Elephant Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. 249 pp.

Martin, E. and Stiles, D. (2000). *The Ivory Markets of Africa*. Save the Elephants, Nairobi, Kenya, and London, UK. 84 pp.

Tom Milliken, *Director, TRAFFIC East/Southern Africa*

The South and South East Asian Ivory Markets

Esmond Martin and Daniel Stiles

Published by
Save the Elephants
88 pp. 2002
ISBN 9966-9683-2-6

Details of availability:

PO Box 54667
Nairobi
Kenya

c/o Ambrose Appelbe
7 New Square,
Lincoln's Inn
London WC2A 3RA
UK

BOOK REVIEW BOOK REVIEW BOOK REVIEW BOOK REVIEW BOOK REVIEW BOOK REVIEW BOOK REVIEW BOOK REVIEW BOOK REVIEW BOOK

A review by Tom Milliken, Director, TRAFFIC East/Southern Africa

The Ivory Markets of Africa, the report by Esmond Martin and Daniel Stiles published in early 2000 just prior to the 11th meeting of the Conference of the Parties to CITES, was a timely reminder about the 'forgotten' ivory trade within Africa. Martin and Stiles documented in great detail the fact that most of Africa's domestic ivory markets remain unregulated by government authorities, result in the illicit movement of ivory both within Africa and beyond, and most certainly are directly responsible for illegal killing of elephants throughout the continent.

Once again, in the build up to the 12th meeting of the Conference of the Parties to CITES, Martin and Stiles are back with their latest look at ivory markets around the world. This time their focus is on Nepal, Sri Lanka, Myanmar, Thailand, Cambodia, Laos, Vietnam and Singapore. Their report, ***The South and South East Asian Ivory Markets***, chronicles a five-month journey, from November 2000 to March 2001, through these countries, seven of which are Asian Elephant *Elephas maximus* range States. The study provides contemporary insight into the buying and selling, carving and marketing of ivory in a region renowned for its deep cultural affinity towards elephants and historical appreciation of ivory.

While there are many useful observations in this report, there is a glaring omission. Any review of the ivory trade in South Asia that completely omits India is, at the very least, a questionable reflection of regional ivory trade dynamics. The authors recognize that an explanation is required, but their justification for excluding the country which was, in the very recent past, South Asia's largest domestic ivory market, has a hollow ring to it. They point to the fact that India formally banned all internal trade in ivory in May 1992, and that the display of ivory products is extremely rare in New Delhi, the capital city, and Mumbai (formerly Bombay), the country's commercial centre. With this cursory treatment, the authors then tell us that "India was not included in this survey as ivory is no longer an important trade item in the shops".

India's largest domestic ivory market has always been in the south of the country, particularly in the States of Kerala, Karnataka and Tamil Nadu, and in Rajasthan, with its tradition of Moghul-style miniature paintings on ivory. Indeed, the country's largest seizure of worked ivory products in recent history, consisting of four huge ivory carvings of Hindu gods - one nearly 1.2 m high and over 40 kg - was seized in May 2002 in Trivandrum, the capital of Kerala.

So why would spot checks in two northern cities put these veteran investigators 'off track' so readily? Indeed, Martin and Stiles themselves document Indian trade in other parts of their report. For example, they state that both raw ivory and worked ivory products in Nepal originate from India; that Sri Lanka imports small quantities of worked ivory from India; and that an Indian merchant from Chennai (formerly Madras) comes twice a year to Myanmar to buy ivory products for resale back home.

This all adds up to one conclusion: India's domestic ivory market may be in a state of flux and moving deeper underground in response to legal prohibitions, but it is certainly not going away. In CITES fora, India officially has claimed that elephant poaching is increasing nationally, and attributed the increase to the downlisting of certain populations of African Elephants. Others, however, see this as a kind of 'smoke screen' denial about the extent of local trade demand and the poor state of management in the country's protected areas. This is an important question to resolve so India's ivory trade deserves full investigative treatment, and the challenge is to 'dig deeper' than just observing what is in the shops. With the world's largest Asian Elephant population, understanding the ivory trade dynamics in India remains an urgent priority.

Another weakness of the report concerns the treatment of the price data, particularly the USD values for raw ivory. These data are based on an undisclosed sample size of dealers and carvers, who may or may not be giving 'inflated' answers to investigators posing as prospective buyers of worked ivory products. It is worth noting that for retail-level prices of worked ivory products, readers are advised that bargaining will reduce the price by anywhere from 20-50%, depending on the country in question. One wonders if a similar margin applies to the raw ivory price data too? In fact, the rather questionable 2001 price data for Sri

Lanka seems to derive from an inconclusive and confusing bargaining scenario with a single dealer. It is appreciated that less subjective data such as Customs import statistics, public auction records, or other 'hard' information pertaining to specific raw ivory transactions are simply not available, but more attempt needs to be made to present the price data at hand as broadly indicative values rather than actual prices.

A more fundamental problem concerns the analysis of these data. The authors acknowledge the value of looking for trends in the price data, devote a chapter to this issue, and comparatively present data on the purchase price of raw ivory at various points in time from 1979 onwards. There is, however, no attempt to analyse these data to account for inflation or other economic factors. A far more meaningful approach would involve choosing a baseline year, say 1989, the year the CITES Parties agreed to place all African Elephant populations in Appendix I, and converting all the USD prices into 1989 USD terms using the Gross Domestic Product (GDP) Deflator inflation index. Doing so would allow real market trends to emerge far more vividly.

Because the authors fail to do this, the price trend analysis in the report is somewhat misleading. Consider the data when corrected for inflation in Table 1: Martin and Stiles inform us that the current price of raw ivory is higher in all countries since any time before 1990 when the CITES trade ban took effect. In fact, when presented in 1989 USD terms, 1979 raw ivory prices in Nepal, Thailand and Sri Lanka are all 15-30% higher than the 2001 price data from this study. In the two South Asian countries, the decline in price reflects a serious drop in demand for ivory, while in Thailand, an abundant supply of ivory, including cheap illegal African imports, serves to keep prices low in the face of ongoing demand.

Country	Year	USD price for raw ivory 1-5 kg	USD price adjusted for inflation in 1989	Trend in 1989 USD terms
Nepal	1979	140	225	Declining since 1998; currently compatible with 1982 prices.
	1982	92-115	116-145	
	1991	187	174	
	1998	242	195	
	2001	166-207	128-159	
Sri Lanka	1979	170	273	Increase since 1987, but less than 1979 price.
	1987	110	118	
	2001	300?	231?	
Myanmar	1981	26	35	Decrease since 1993, but greater than 1981 price.
	1993	256	227	
	1995	239	203	
	2001	142	109	
Thailand	1979	99	159	Decrease since 1979.
	2001	159	122	
Cambodia	1991	150	139	Decrease since 1994, but greater than 1991.
	1992	340	309	
	1994	400	346	
	2001	338	260	
Laos	1988	100	104	Stable or slight increase since 1990, but greater than 1988.
	1990	200	193	
	2001	250-300	193-231	
Vietnam	1989	150	150	Increase since 1989.
	1991	100-200	93-186	
	2001	350-500	270-385	

Table 1. Martin and Stiles (2002) price data adjusted for inflation in 1989 USD terms.

Comparing the last two data points in 1989 USD terms, raw ivory prices have declined in all countries except Sri Lanka and Vietnam, while Laos shows either a stable or slightly increasing price. Overall, this suggests that the 1999 one-off ivory sale under CITES has not resulted in a general price increase in South and South East Asian markets as some critics originally feared, but the three anomalies require explanation. As noted, the rising Sri Lanka price data for 2001 are questionable and make interpretation difficult when all other indicators point to both a decreasing supply and demand for ivory in that country. On the other hand, the price increases in the two Indochina countries probably reflect the precipitous decline of local Asian Elephant populations from which most locally-carved ivory is sourced. Since the late 1980s, Laos and Vietnam have lost 55% and 92% of their elephant numbers, respectively, a fact that impacts the local ivory supply to drive prices higher.

The issues of India and the price analysis aside, what do Martin and Stiles tell us? In summary, they observe a minimum of 105 000 ivory items for sale from 521 retail outlets in 18 cities, and identify the existence of at least 200 ivory carvers working from some 30 workshops in the eight countries visited. In fact, the retail-level availability of ivory artefacts is almost equal to the number of items observed during their 15-country African study two years ago. And the buyers include legions of foreign tourists, travelling businessmen and, for large items like polished tusks, local connoisseurs, who attach cultural significance, such as good luck, prosperity and status, to the ownership of such possessions.

But things are not equal and Thailand looms as the region's ivory trade giant. Of the ivory products observed, 84% - or over 88 000 individual items - were found in three Thai cities - Bangkok, Chiang Mai and Phayuha Kiri. Indeed, the dimensions of Thailand's ivory trade exceeds anything witnessed in Africa, and the authors make the remarkable point that the current trade has changed little since the 1990 ivory trade ban under CITES took effect. If so, Thailand is perhaps the only country in the world where this is true. The authors also document the fact that Thailand's appetite for ivory is wedded to large-scale, illegal imports from Africa, as well as raw ivory from neighbouring Myanmar and possibly Indochina. This all correlates well with the ivory seizure data in the Elephant Trade Information System (ETIS) where Thailand is continually identified as a major destination for raw ivory and a source of worked ivory products that are seized by other countries all over the world.

After Thailand, Myanmar ranks as the second most important ivory market in the region. There, the domestic trade in ivory continues to grow, with an expansion in the number of retail outlets evident since the country's shift towards a free-market economy. Interestingly, the number of carvers has remained largely static in comparison to the sharp decline in most other countries surveyed. The

Photographs: Esmond Bradley Martin

^^ and page 58 Intricate ivory figurines, such as this one for sale in Bangkok, are becoming rare in Thailand.

^ Two tusk pieces being carved into religious figurines, Patan, Nepal, February 2001.

v Most ivory pieces for sale in Bangkok consist of jewellery (Inset: ivory carver in Singapore making dice in the 1980s).

"The overall scale of the ivory trade in South and South East Asia is of great concern... It appears that demand for ivory has remained steady or has increased in some countries since the mid-1990s, stimulating elephant poaching."

evidence also shows that in addition to serving a growing tourist market internally, Myanmar also exports worked ivory products to China and is a source of raw ivory for Thailand's ivory industry.

Though considerable ivory was also observed in Singapore, it is the only country surveyed where ivory is no longer carved locally. In fact, most worked ivory items represent stock from an earlier, pre-CITES trade ban, period, though high-value works of art may still be imported illegally from China and Hong Kong. Vietnam also harbours significant volumes of worked ivory, but the authors report decreasing demand for ivory there, and in Cambodia and Laos. However, there is little room for consolation as local ivory carving industries in these countries, along with Sri Lanka and Myanmar, are supported with ivory from declining, highly-endangered Asian Elephant populations.

Equally worrying, Martin and Stiles correctly emphasize that *none* of the countries surveyed has adequate control over their ivory carving industries or retail-level markets. This is the case in Sri Lanka, Nepal, Laos and Vietnam where all ivory trade is ostensibly prohibited by law, as well as the remaining countries where legality is subject to various, largely ambiguous, conditions. Cross border trade in raw ivory and worked ivory products is not uncommon, and law enforcement, even in the face of clear infractions, is often non-existent. Admirably, Martin and Stiles do not mince their words when they note that "officials also take bribes in order to allow ivory to enter and leave their countries". In the process, CITES violations add up with frequent regularity.

In all countries visited, ivory trade dynamics appear to be locally- or regionally-driven, and Martin and Stiles point out that they have been unable to detect any influence from the legal ivory transactions from Africa to Japan in 1999. "Not a single shop owner nor vendor mentioned these official sales in southern Africa because they either did not find them significant or more likely had never heard of them", they tell us.

As these reports always arrive just prior to a CITES Conference, it would be useful if the authors would directly relate their findings to CITES mechanisms. Resolution Conf. 10.10 (Rev.), first adopted in June 1997 at the tenth meeting of the Conference of the Parties, stipulates conditions for the allowance of domestic trade in ivory. This text is reproduced on page 57.

Without specific reference to this Resolution, Martin and Stiles nonetheless indicate that *none* of the countries they surveyed is complying with the requirements for domestic ivory markets approved by the CITES Parties. In the context of the one-off, CITES-approved ivory sale, Japan has been held to the Resolution Conf. 10.10 standard and passed, but so far no other Asian country with a domestic ivory market has been formally scrutinized against the CITES criteria.

Indeed, the scale of Thailand's domestic ivory trade is such that it has global impact and arguably deserves international censure. And the ongoing ivory trade in Indochina is driving the local extinction of Asian Elephants in Vietnam, Cambodia and Laos. Even Myanmar, the authors argue, will be unable to sustain the current level of its ivory carving industry without a serious reduction in elephant numbers.

In the final analysis, Martin and Stiles deserve to be commended for keeping the focus on domestic ivory markets. Despite certain issues noted above, their observations and instincts are generally right on target. Through their efforts, South and South East Asia's ivory trade has once again come alive, sometimes with frightening detail. Their message rings clear: whether in Asia or Africa, illegal and unregulated domestic ivory markets are the single most destructive element in elephant conservation today. It is time that compliance with the criteria in Resolution Conf 10.10 (Rev.) is universally applied and all countries are held accountable for their domestic ivory markets.

Tom Milliken, *Director, TRAFFIC East/Southern Africa*

Twelfth Meeting of the Conference of the Parties to CITES

The 12th meeting of the Conference of the Parties to CITES will be held on 3 to 15 November 2002, in Santiago, Chile. The CITES Secretariat has received 54 proposals to amend CITES Appendices I and II. The list, presented below, has been adapted from the CITES Secretariat website at www.cites.org, where provisional assessments of the proposals in relation to the Secretariat's obligations under Article XV, paragraph 1, of the Convention, can be found. TRAFFIC's analyses and recommendations can be found at www.traffic.org.

Proposal No. and Proponent	Species Covered by the Proposal	Proposal
1. Switzerland		Amendment of annotation °607 to read: The following are not subject to the provisions of the Convention: a) synthetically derived DNA that does not contain any part of the original; b) urine and faeces; c) synthetically produced medicines and other pharmaceutical products such as vaccines that do not contain any part of the original genetic material from which they are derived; and d) fossils.
FAUNA		
2. Switzerland	Lovebirds *Agapornis* spp. *Barnardius* spp. *Platycercus* spp. Yellow-crowned Parakeet *Cyanorhamphus auriceps* New Zealand Parakeet *C. novaezelandiae* Alexandrine Parakeet *Psittacula eupatria* Ring-necked Parakeet *P. krameri* Java Sparrow *Padda oryzivora*	Annotation with the following text: Colour morphs produced by captive breeding are considered as being of a domesticated form and are therefore not subject to the provisions of the Convention.
3. Georgia	Black Sea Bottle-nosed Dolphin *Tursiops truncatus ponticus*	Transfer from Appendix II to Appendix I
4. Japan	Minke Whale *Balaenoptera acutorostrata*	Transfer from Appendix I to Appendix II of northern hemisphere populations (except the Yellow Sea, East China Sea and Sea of Japan populations) in accordance with Resolution Conf. 9.24, Annex 4 with the following annotation: For the exclusive purpose of allowing trade between Parties that are also signatories to the International Convention for the Regulation of Whaling and which have an effective DNA register system to monitor catches, introductions from the sea and imports from other States. To ensure that trade does not result in removals in excess of catch limits, the following additional measures shall be implemented: a) notwithstanding the provisions of CITES Article XIV, paragraphs 4 and 5, any trade shall be subject to the provisions of Article IV; b) calculation of a safe catch level using the IWC's Revised Management Procedure (RMP); c) establishment of export quotas that shall ensure that trade does not result in removals in excess of catch limits; d) indication on the trade documents of the number of animals involved when shipment of products are only parts of animals, and tracking of this number through DNA monitoring of imports; e) implementation of domestic legislation to ensure imports are from animals taken legally; and f) DNA registers to monitor catches, introductions from the sea and imports and a requirement that all imports be accompanied by certified DNA profiles.
5. Japan	Bryde's Whale *Balaenoptera edeni*	Transfer from Appendix I to Appendix II of the western North Pacific population in accordance with Resolution Conf. 9.24, Annex 4 with the following annotation: For the exclusive purpose of allowing trade between Parties that are also signatories to the International Convention for the Regulation of Whaling and which have an effective DNA register system to monitor catches, introductions from the sea and imports from other States. To ensure that trade does not result in removals in excess of catch limits, the following additional measures shall be implemented: a) notwithstanding the provisions of CITES Article XIV, paragraphs 4 and 5, any trade shall be subject to the provisions of Article IV; and b) calculation of a safe catch level using the IWC's Revised Management Procedure (RMP); c) establishment of an export quota that shall ensure that trade does not result in removals in excess of catch limits; d) indication on the trade documents of the number of animals involved when shipment of products are only parts of animals, and tracking of this number through DNA monitoring of imports; e) implementation of domestic legislation to ensure imports are from animals taken legally; and f) DNA registers to monitor catches, introductions from the sea and imports and a requirement that all imports be accompanied by certified DNA profiles.
6. Botswana	African Elephant *Loxodonta africana*	Amendment of annotation °604 regarding the population of Botswana to read: For the exclusive purpose of allowing in the case of the population of Botswana: a) trade in hunting trophies for non-commercial purposes; b) trade in live animals for commercial purposes to appropriate and acceptable destinations (and as determined by the national legislation of the country of import); c) trade in registered stocks of raw ivory (whole tusks and pieces) of Botswana origin owned by the Government of Botswana for commercial purposes only to CITES-approved trading partners who will not re-export ivory. No international trade in ivory to be permitted until 18 months after the adoption of the proposal (May 2004). Thereafter an initial amount of not more than 20 000 kg of ivory may be traded, followed by annual export quotas of not more than 4000 kg from the year 2005 onward; d) trade in hides; e) trade in leather goods for non-commercial purposes; and f) trade in ivory carvings for non-commercial purposes.
7. Namibia	African Elephant *Loxodonta africana*	Amendment of annotation °604 regarding the Namibian population to read: For the exclusive purpose of allowing in the case of the population of Namibia: a) trade in hunting trophies for non-commercial purposes; b) trade in live animals for non-commercial purposes to appropriate and acceptable destinations (as determined by the national legislation of the country of import); c) trade in hides; d) trade in leather goods and ivory carvings for non-commercial purposes; and e) trade in registered stocks of raw ivory (whole tusks and pieces) of Namibian origin owned by the Government of the Republic of Namibia to trading partners that have been verified by the CITES Secretariat to have sufficient national legislation and domestic trade controls to ensure that ivory imported from Namibia will not be re-exported and will be managed according to all requirements of Resolution Conf. 10.10 (Rev.) concerning domestic manufacturing and trade. No international trade in ivory to be permitted until 18 months after the adoption of the proposal (May 2004). Thereafter, an initial amount of not more than 10 000 kg of ivory may be traded, followed by annual export quotas of not more than 2000 kg of ivory, from the year 2005 onwards.

8. South Africa	African Elephant *Loxodonta africana*	Amendment of annotation °604 regarding the South African population to allow the initial sale of the Kruger National Park stockpile of ivory, 18 months after the adoption of the proposal and a subsequent annual quota of two tonnes. This proposal is for the exclusive purpose of allowing in the case of the population of South Africa: a) trade in hunting trophies for non-commercial purposes; b) trade in live animals for re-introduction purposes into protected areas formally proclaimed in terms of the legislation of the importing country; c) trade in hides and leather goods; d) trade in raw ivory of whole tusks of any size, and cut pieces of ivory that are both 20 cm or more in length and one kilogramme or more in weight of Government-owned stocks originating from the Kruger National Park. An initial stockpile of 30 000 kg is proposed and a subsequent annual quota of 2000 kg accumulated each year through annual mortalities and management practices. All other specimens shall be deemed to be specimens of species included in Appendix I and the trade in them shall be regulated accordingly.
9. Zambia	African Elephant *Loxodonta africana*	Transfer of the Zambian population from Appendix I to Appendix II for the purpose of allowing: a) trade in raw ivory under a quota of 17 000 kg of whole tusks owned by Zambia Wildlife Authority (ZAWA) obtained from management operations; and b) live sales under special circumstances.
10. Zimbabwe	African Elephant *Loxodonta africana*	Amendment of annotation °604 regarding the population of Zimbabwe to read: For the exclusive purpose of allowing in the case of the population of Zimbabwe: a) trade for commercial purposes in registered stocks of raw ivory (whole tusks and pieces) of Zimbabwean origin owned by the Government of the Republic of Zimbabwe, to trading partners that have been verified by the CITES Secretariat to have sufficient national legislation and domestic trade controls to ensure that ivory imported from Zimbabwe will not be re-exported and will be managed according to all requirements of Resolution Conf. 10.10 (Rev.) concerning domestic manufacturing and trade. No international trade in ivory to be permitted until 18 months after the adoption of the proposal (May 2004). Thereafter, an initial one-off quota of not more than 10 000 kg of ivory may be traded, and a subsequent annual quota of not more than 5000 kg of ivory; b) trade in hunting trophies for non-commercial purposes; c) trade in live animals for non-commercial purposes to appropriate and acceptable destinations; d) trade in hides and leather goods; and e) trade in ivory carvings for non-commercial purposes.
11. India, Kenya	African Elephant *Loxodonta africana*	Transfer to Appendix I of populations currently included in Appendix II, in accordance with Resolution Conf. 9.24, Annex 1, sections C.i) and ii) and D, and in light of Annex 3 on 'Split-listing' and Annex 4 on 'Precautionary measures'.
12. Argentina	Vicuña *Vicugna vicugna*	Transfer from Appendix I to Appendix II of the population of Vicuña of the province of Catamarca, for the exclusive purpose of allowing international trade in wool reared from live animals, in cloth, derived manufactured products and other handicraft artefacts bearing the label 'VICUÑA – ARGENTINA'.
13. Bolivia	Vicuña *Vicugna vicugna*	Transfer to Appendix II of the populations of Bolivia that are in Appendix I, in accordance with Article II, paragraph 2(a), of the Convention, with the exclusive purpose of allowing international trade in products made from wool sheared from live animals and bearing the label 'VICUÑA – BOLIVIA'.
14. Chile	Vicuña *Vicugna vicugna*	Transfer from Appendix I to Appendix II of the population of the Primera Región of Chile through a modification of annotations -106 and +211.
15. Chile	Southern Lesser Rhea *Rhea pennata pennata*	Transfer from Appendix I to Appendix II of the Chilean population, in accordance with Resolution Conf. 9.24, Annex 4, section B.2.b).
16. Costa Rica	Yellow-naped Amazon *Amazona auropalliata*	Transfer from Appendix II to Appendix I
17. Mexico	Yellow-headed Amazon *Amazona oratrix*	Transfer from Appendix II to Appendix I
18. Germany[1]	Blue-headed Macaw *Ara couloni*	Transfer from Appendix II to Appendix I in accordance with Resolution Conf. 9.24, Annex 1, section D.
19. South Africa	Brown-necked Parrot *Poicephalus robustus*	Transfer of the South African population from Appendix II to Appendix I in accordance with Resolution Conf. 9.24, Annex 1, sections A.ii), B.i) and C.ii).
20. China, USA	*Platysternon megacephalum*	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2 a, sections A and B i).
21. China, Germany[1]	Annam Leaf Turtle *Annamemys annamensis*	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2 a, sections A, and B (i) and (ii).
22. China, Germany[1]	*Heosemys* spp.	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2 a: a) sections A and B (i) for *H. depressa*; b) section B (i) for *H. grandis* and *H. spinosa*; and c) section A for *H. leytensis*.
23. China, USA	Yellow-headed Temple Turtles *Hieremys annandalii*	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2a, sections A and Bi).
24. India, USA	*Kachuga* spp. (except *K. tecta*)	Inclusion in Appendix II with the exception of *K. tecta* in accordance with Article II, paragraph 2(a), of the Convention and: a) Resolution Conf. 9.24, Annex 2 a, sections A and B for *K. dhongoka*, *K. kachuga*, *K. sylhetensis* and *K. trivittata*; and b) Resolution Conf. 9.24, Annex 2 b, section A for *K. smithii* and *K. tentoria*.
25. China, Germany[1]	*Leucocephalon yuwonoi*	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2 a, sections A and B (i).
26. China, USA	Asian Yellow Pond Turtle *Mauremys mutica*	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf.9.24, Annex 2a, sections A and B i).
27. China, Germany[1]	Malaysian Giant Turtle *Orlitia borneensis*	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2 a, section B (i).
28. China, USA	Keeled Box Turtle *Pyxidea mouhotii*	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2a, sections A and Bi).
29. China, USA	Black Marsh Turtle *Siebenrockiella crassicollis*	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2a, sections A and Bi).
30. Cuba	Hawksbill Turtle *Eretmochelys imbricata*	Transfer of the population in Cuban waters from Appendix I to Appendix II, pursuant to Resolution Conf. 9.24, for the exclusive purpose of allowing the Government of Cuba to export its stockpile of shell plates (7[illegible] accumulated legally from its national conservation and management pro[illegible] etween 1993 and 2002, annotated as follows: a) the export will not take plac[illegible] CITES Secretariat has verified, within 12 months of the decision, that the imp[illegible]try has adequate internal trade controls and will not re-export and the CITES Sta[illegible] Committee accepts this verification; and b) the wild population in Cuban waters will continue to be managed as an Appendix-I species.
31. China, USA	*Chitra* spp.	Inclusion in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2a, sections A and B i).

32. China, USA	*Pelochelys* spp.	Inclusion in Appendix II a) *P. cantorii*: in accordance with Article II, paragraph 2(a), of the Convention, and Resolution Conf. 9.24, Annex 2a, sections A and Bi); and b) *P. bibroni*: in accordance with Article II, paragraph 2(b), of the Convention, and Resolution Conf. 9.24, Annex 2b, section A.
33. New Zealand	*Hoplodactylus* spp. and *Naultinus* spp.	Inclusion in Appendix II in accordance with Article II, paragraphs 2(a) and 2(b), of the Convention
34. USA	Orange-throated Race-runner *Cnemidophorus hyperythrus*	Deletion from Appendix II
35. India, Philippines	Whale Shark *Rhincodon typus*	Inclusion in Appendix II
36. UK[1]	Basking Shark *Cetorhinus maximus*	Inclusion in Appendix II
37. USA	Seahorses *Hippocampus* spp.	Inclusion in Appendix II a) *Hippocampus comes*, *H. spinosissimus*, *H. barbouri*, *H. reidi*, *H. erectus*, and *H. ingens* in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2 a, section B.i); and b) the other 26 described species in accordance with Article II, paragraph 2(b), of the Convention, and Resolution Conf. 9.24, Annex 2 b, section A.
38. USA	Humphead Wrasse *Cheilinus undulatus*	Inclusion in Appendix II in accordance with Resolution Conf. 9.24, Annex 2 a, section B.
39. Australia	Patagonian Toothfish *Dissostichus eleginoides* Antartctic Toothfish *D. mawsonii*	Inclusion of *D. eleginoides* in Appendix II, in accordance with Article II, paragraph 2(a), of the Convention; and inclusion of *D. mawsonii* in Appendix II, in accordance with Article II, paragraph 2(b), of the Convention; with the following annotation: The conservation, management or other relevant measures or resolutions adopted for *Dissostichus* spp. by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), relating to *Dissostichus* spp. harvested from within the CCAMLR Convention Area, shall apply for the purposes of regulating trade in *Dissostichus* spp. under CITES including for the purposes of Article IV of CITES. States party to CITES conducting trade in *Dissostichus* spp. harvested and traded in compliance with the conservation, management and other relevant measures or resolutions adopted by CCAMLR, including the Catch Documentation Scheme for *Dissostichus* spp., shall be regarded as having fulfilled their obligations under CITES as regards trade in *Dissostichus* spp. Trade in *Dissostichus* spp. harvested outside the CCAMLR Convention Area shall be subject to the relevant provisions of CITES and shall be regulated accordingly.
40. Germany[1]	Sri Lankan Rose *Atrophaneura jophon* *A. pandiyana*	Inclusion of *Atrophaneura jophon* in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2 a, section A; and inclusion of *Atrophaneura pandiyana* in Appendix II in accordance with Article II, paragraph 2(b), of the Convention and Resolution Conf. 9.24, Annex 2 b, section A.
41. Germany[1]	*Papilio aristophontes* *P. nireus* and *P. sosia*	Inclusion of *Papilio aristophontes* in Appendix II in accordance with Article II, paragraph 2(a), of the Convention and Resolution Conf. 9.24, Annex 2 a, section A; and inclusion of *P. nireus* and *P. sosia* in Appendix II in accordance with Article II, paragraph 2(b), of the Convention and Resolution Conf. 9.24, Annex 2 b, section A.
FLORA		
42. Argentina	Monkey Puzzle Tree *Araucaria araucana*	Inclusion of *Araucaria araucana* in Appendix I, replacing *Araucaria araucana*[2] +219 (populations of Argentina and Chile) and deletion of *Araucaria araucana*[3] -114 #1 in Appendix II.
43. Switzerland	All taxa listed in Appendix II	Amendment of the text of the annotation °608 that refers to artificially propagated specimens of *Gymnocalycium mihanovichii* (cultivars) forms lacking chlorophyll, to read as follows: Cactaceae spp. colour mutants lacking chlorophyll, grafted on the following grafting stocks: Harrisia "Jusbertii", *Hylocereus trigonus* or *Hylocereus undatus*.
44. Switzerland	Opuntioideae spp.	Deletion from Appendix II
45. Switzerland	Pereskioideae spp. *Pereskiopsis* spp. *Quiabentia* spp.	Deletion from Appendix II
46. USA	*Sclerocactus nyensis*	Transfer from Appendix II to Appendix I
47. USA	*Sclerocactus spinosior* ssp. *blainei*	Transfer from Appendix II to Appendix I
48. USA	Santa Barbara Island Dudleya *Dudleya traskiae*	Transfer from Appendix I to Appendix II
49. South Africa	*Aloe thorncroftii*	Transfer from Appendix I to Appendix II in accordance with Resolution Conf. 9.24, Annex 4, section B, paragraph 2 a)
50. Guatemala Nicaragua	Bigleaf Mahogany *Swietenia macrophylla*	Inclusion in Appendix II of the neotropical populations, including logs, sawn wood, veneer sheets and plywood, in accordance with Article II, paragraph 2(a), of the Convention and Resolution , Annex 2 a.
51. USA	Appendix-II ORCHIDACEAE spp.	Annotation of Orchidaceae in Appendix II The annotation to specifically read as follows: Artificially propagated specimens of hybrids within the genera *Cattleya*, *Cymbidium*, *Dendrobium (phalaenopsis* and *nobile* types only), *Oncidium*, *Phalaenopsis* and *Vanda*, including their intergeneric hybrids, are not subject to the provisions of the Convention when: a) specimens are traded in shipments consisting of individual containers (i.e. cartons, boxes, or crates) containing 100 or more plants each; b) all plants within a container are of the same hybrid, with no mixing of different hybrids within a container; c) plants within a container can be readily recognized as artificially propagated specimens by exhibiting a high degree of uniformity in size and stage of growth, cleanliness, intact root systems, and general absence of damage or injury that could be attributable to plants originating in the wild; d) plants do not exhibit characteristics of wild origin, such as damage by insects or other animals, fungi or algae adhering to leaves, or mechanical damage to roots, leaves, or other parts resulting from collection; and e) shipments are accompanied by documentation, such as an invoice, which clearly states the number of plants and which of the six exempt genera are included in the shipment, and is signed by the shipper. Plants not clearly qualifying for the exemption must be accompanied by appropriate CITES documents.
52. China	Desert-living Cistanche *Cistanche deserticola*	Deletion of the annotation to *Cistanche deserticola* in Appendix II
53. USA	Maguire's Bitter-root *Lewisia maguirei*	Deletion from Appendix II
54. Germany[1]	*Guaiacum* spp.	Inclusion in Appendix II in accordance with Article II, paragraph 2(b), of the Convention, annotated as follows: Designates all parts and derivatives, including wood, bark and extract.

[1] *on behalf of the Member States of the European Community.*
[2] *where the annotations meant that the population of Chile was listed in that Appendix and the other(s) in Appendix II.*
[3] *where the annotations meant that the species was listed in that Appendix except the population of Chile listed in Appendix I.*

THE IMPACT OF WILDLIFE TRADE CONTROLS ON LIVELIHOODS

Most of the research and literature concerned with the trade in wild species focuses on issues of conservation and the effectiveness of existing trade controls. Very little is written about the wildlife trade in terms of the importance of the trade to and the impacts of trade controls on rural harvesters and collectors.

A recent report by International Institute for Environment and Development (IIED) and TRAFFIC sets out to increase understanding of the wildlife trade in terms of its contribution to rural livelihoods, and how trade controls influence rural incomes. Chapters on the use and trade of wild species, the design of international trade controls and their impacts on conservation and livelihoods are followed by a case study conducted in the East Usambara Mountains of Tanzania.

The concluding sections explore the question of whether trade controls result in a 'lose-lose' scenario for people and wildlife, and include recommendations on how to better adapt wildlife trade controls to the needs of people as well as species conservation. Specific attention is given to the need for better synergy in the implementation of CITES and the Convention on Biological Diversity.

Teresa Mulliken, *Research & Policy Co-ordinator, TRAFFIC International*

Making a Killing or Making a Living? Wildlife trade, trade controls and rural livelihoods. Dilys Roe, Teresa Mulliken, Simon Milledge, Josephine Mremi, Simon Mosha and Maryanne Grieg-Gran. IIED, London. Available from Earthprint, PO Box 119, Stevenage, Herts SG1 4TP UK.

http://www.earthprint.com

Electronic copies available from www.traffic.org and www.iied.org.

GUAIACUM TRADE SURVEY IN GERMANY

Guaiacum, also know as 'Lignum vitae' is a mostly neotropical tree genus used for medicinal and timber purposes. To assess the conservation impact of international trade on the Mexican endemic species *Guaiacum coulteri*, a survey on imports into and use of the species in Germany was carried out between November 2001 and February 2002 on behalf of the German CITES Scientific Authority. Overall demand for *G. coulteri* in Germany is between 50 t and 90 t a year. About 50 t are imported for the timber market. A few kilogrammes of *G. coulteri* imports are contained annually within ready-made diagnostic sets used for detecting hidden gastrointestinal bleeding. The sets contain Guaiac, the resin of the heartwood.

Guaiacum resin and wooden chips are also used as an aromatic compound for the liqueur industry. Demand at species level could not be determined, but a maximum of 40 t per year is estimated to be used for this purpose. CITES Appendix II-listed species *G. sanctum* and *G. officinale* are imported to Germany only sporadically. Contradiction between minimal imports of these two species and demand for *Guaiacum* products cannot be clarified definitely. Saturation of the demand by *G. coulteri* imports, stock disposal of *G. sanctum* and *G. officinale*, false declaration of the latter species imported as *G. coulteri* or illegal imports are all possible explanations. Considering a listing of *G. coulteri* within an approach to list the whole genus *Guaiacum* in Appendix II of CITES has been proposed to the German CITES Scientific Authority for the 12th meeting of the Conference of the Parties to CITES.

Matthias Schleuning, *TRAFFIC Europe*

Source: Barsch, F., Honnef, S. and Melisch, R. (2002). Handel mit Guaiacum coulteri *in Deutschland. TRAFFIC Europe-Germany im Auftrag des Bundesamtes für Naturschutz. Frankfurt, Germany. 5 pp. and Annex.*

More information: CITES amendment proposal for *Guaiacum* spp.:
http://www.cites.org/common/cop/12/prop/eng/E12-P54.pdf
IUCN/TRAFFIC Analysis for *Guaiacum* spp.:
http://www.iucn.org/webfiles/doc/SSC/CoP12/Analyses/1254.pdf
TRAFFIC Recommendations:
http://www.traffic.org/cop12/proposal42_54.html#pro54

A market south of Durban, > South Africa, selling wildlife medicines (*muthi*).

WILDLIFE FOR SALE IN MARRAKECH, MOROCCO

Morocco has been a Party to CITES since 1975. In March 2001, the Royal Society for the Protection of Cruelty to Animals (RSPCA) Special Operations Unit from the UK carried out an investigation in the country over three days. The aim of the visit had been to ascertain the scale and nature of the animal trade within Marrakech, with particular attention to tortoises and related products available to tourists following a dramatic increase in information received by the Society regarding illegal importation of tortoises from North Africa.

The Place Djemaa el Fna is the traditional meeting place for merchants and buyers from the Sous region, the Atlas Mountains and the south of the country, and is very much the heart of Marrakech. The square is located on the edge of the *souk* district - a collection of market stalls located in a maze of narrow streets where foodstuffs, spices, clothes, souvenirs, animals, and many other commodities are on sale. Animals and animal products seen here in a two-hour period included 534 Spur-thighed Tortoises *Testudo graeca* (CITES II) (GBP2-13/USD3-19 each), 20 musical instruments made from tortoise carapaces, 50 live chameleons, 100 live lizards *Uromastyx*, skins of 17 Leopards *Panthera pardus* (CITES I) (GBP600/USD882 each), one Lion *Panthera leo* (CITES II) skin (GBP600 each), six Desert Hedgehogs *Hemiechinus aethiopicus*, 10 scorpions, six Kestrels *Falco*, snake skins and other skins described as wolf, jackal and cat. The prices quoted were starting prices and varied greatly from one stall to another, where haggling is still an integral part of shopping. Many were of CITES-listed species and would require permits if exported. However, stallholders maintained that exporting these items to the UK would not be a problem and no paperwork was necessary. One trader was selling several Leopard skins, one of which appeared to have shotgun pellet holes around the head and neck. He also offered to supply a further 20 Leopard skins at GBP330/USD485 each, as well as provide the services of a courier to deliver the goods to the UK if required. He said that the animals had come from Niger and Chad.

The live specimens for sale were displayed at the front of the stalls and were the first commodity likely to be noticed by the public. Almost without exception these animals were in extremely poor condition, in overstocked cages, with little or no provision of food and water. Traders stated that the specimens were from the wild. The tortoises had been collected in Morocco and the large numbers available was in marked contrast to the findings of a survey in 1996 where only a few live specimens were seen for sale (Highfield and Bayley, 1996). The prices for the tortoises were low, so tourists are likely to be particularly vulnerable to purchasing specimens, either from a humane perspective or from ignorance of UK importation regulations. The criminal element will also be attracted to these markets, where, for example, a GBP1/USD1.5 tortoise could reap 10 000% profit in the UK. In 2001, the RSPCA Special Operations Unit investigated an incident in which three women from the UK purchased eight tortoises from markets in Marrakech. They travelled from Morocco to the UK in a camper van with the tortoises hidden inside, their intention being to sell them for GBP200 (USD294) each. Following intelligence received by the authorities, the suspects were located and a warrant was executed at their home address and the tortoises seized (one later died). The suspects admitted importing the tortoises illegally and received written cautions.

Top: Snake charmer, Marrakech.

Right: A species of *Uromastyx*, Spur-thighed Tortoise and chameleons.

Below: Place Djemaa el Fna, Marrakech.

Photographs: RSPCA SOU

In response to the findings of this investigation and a surge in the number of reports to the RSPCA of tortoises coming into the country from North Africa, the Society produced a report, *Shell Shock*, and launched a media campaign to highlight this issue. The report was sent to UK enforcement agencies including the police, Customs, the UK Department for Environment, Food and Rural Affairs, CITES Management Authorities in the EU and North Africa, and other interested parties. A copy can be obtained from the RSPCA, Wilberforce Way, Southwater, West Sussex, RH13 7WN or from www.rspca.org.uk.

Andy Shipp, *RSPCA Special Operations Unit*

Reference: Highfield, A.C. and Bayley, J.R. (1996). The Trade in Tortoise-derived Souvenir Products in Morocco. TRAFFIC Bulletin *16(1):33-35.*

The Significance of Significant Trade

One of the main challenges faced by Parties to CITES is making sure that trade in species listed in Appendix II of the Convention is 'not detrimental to the survival of the species', i.e., is maintained within sustainable levels. Although the making of 'non-detriment findings' is central to CITES' effectiveness, a lack of information, capacity and in some cases political will on the part of some Parties has meant that exports of some species have exceeded sustainable levels. In the worst cases, this has meant that species have become so rare in the wild that the Parties have felt it necessary to introduce Appendix I trade prohibitions.

Concerned at the lack of appropriate non-detriment findings and mechanisms to address these concerns other than trade bans, the Parties established an ongoing review process to review trade volumes and identify species for which trade volumes appeared to be 'significant', i.e. potentially detrimental. After some years of initial development the 'significant trade review process' for animal species was formalized in Resolution Conf. 8.9 (Rev.)[1] **Trade in specimens of Appendix II-listed species taken from the wild**. In addition to providing for a CITES Animals and Plants Committee review of trade volumes and the identification of species for which there are potential problems, the process allows for recommendations to be made to range States about information needs and/or proposed remedial actions such as reducing trade volumes. In cases where range States fail to respond adequately to these recommendations, Resolution Conf. 8.9 (Rev.) also provides for further measures under the auspices of the CITES Standing Committee including, if necessary, the suspension of further imports.

The significant trade review process is now considered central to successful CITES implementation, with more than 230 animal taxa reviewed to date. There are numerous cases where, as a result of the review, trade volumes have been brought within levels considered unlikely to be detrimental to the species in the wild and/or processes have resulted to address ongoing trade concerns. The process has also prompted increased co-operation among range States in addressing the conservation needs of species of shared concern. For example, the review of Acipenseriformes spp. (sturgeon and paddlefish) requested by the Parties at CoP 11 (Gigiri, Kenya, 2000) was followed by a meeting of stakeholders from Caspian Sea range States, the CITES Secretariat and the CITES Animals Committee to discuss the findings and agree solutions. This was the first meeting of this kind, prompting the Caspian Sea governments to start to build a regional science-based management system, significantly enhance efforts to combat illegal harvesting, regulate domestic trade, and implement a caviar labelling system to achieve the long-term conservation and sustainable use of sturgeon.

However, in some cases it appears that the significant trade process has not benefited the conservation of the species reviewed or has had an unintended impact on other species. A decline in the exports of a species from one country may lead to an increase in the exports of that species from other countries, or to an increase in the trade in similar species. Trade in all but four species of chameleon from Madagascar was banned in 1995 when recommendations resulting from a significant trade review of chameleon exports from that country were not implemented. As might have been expected, exports of these four chameleon species increased: exports of Panther Chameleon *Furcifer pardalis* more than doubled from approximately 15 000 to almost 35 000 specimens from 1997-1998. As a result, the Government of Madagascar established export quotas for these four species in 1999.

CITES Parties will be considering a revision of the significant trade process during the 12th meeting of the Conference of the Parties (CoP 12) in November 2002. This will further align the review processes for animal and plant species, following on from the revision of Resolution Conf. 8.9 at CoP 11. Among the issues that will be considered are: greater interaction with range States during the review process; increased flexibility for the Animals and Plants Committees in establishing deadlines for range States to respond to recommendations; a process to follow-up with those range States that have not responded satisfactorily to recommendations; and organization of significant trade reviews following a country-based as well as taxon-based approach. A first study of this type is currently under way in Madagascar, undertaken by TRAFFIC and the UK CITES Scientific Authority for Plants under contract to the CITES Secretariat and with additional funding from the Critical Ecosystem Partnership Fund. The Parties will also consider a recommendation coming from both the CITES Animals and Plants Committees for a review of the effectiveness of the significant trade review process prior to CoP 13.

The significant trade process clearly has an important role to play in ensuring that the trade of Appendix II species remains within sustainable levels. The review called for by the Animals and Plants Committees would allow the Parties to analyse the responses to and effectiveness of different types of recommendations applied thus far, as part of assessing how the process might be improved further in future, including through taking into account socio-economic considerations. However, the significant trade process alone will not be sufficient to secure the future of Appendix II species in trade. Increased investment is needed to improve the capacity of exporting range States to make accurate non-detriment findings. A stronger link between the significant trade process and capacity building for Scientific Authorities will be necessary if the goals of species conservation and sustainable use are to be achieved.

Angela Barden, *CITES Programme Officer, TRAFFIC International;* ***Teresa Mulliken,*** *Research & Policy Co-ordinator, TRAFFIC International*

[1]*First adopted at CoP 8 in 1992 and amended at CoP 11 in 2000.*

GIANT CLAMS:

their Status and Trade in Milne Bay Province, Papua New Guinea

J. KINCH

Milne Bay Province in Papua New Guinea is one of the few areas in the world where wild stocks of giant clams Tridacna *spp. remain. Given the importance of giant clam meat in the subsistence diets of local coastal and island communities and the potential commercial value of both the meat and shells, better management of these stocks is necessary. The province has a long history of poaching and commercial use of giant clams, peaking in the 1970s with illegal incursions by Taiwanese fishing vessels. In 2000, the export of wild giant clam products from Papua New Guinea was banned and continues to be prohibited. Fishing for subsistence purposes by villagers is allowed. This paper outlines the current status of giant clams in Milne Bay Province, examines the exports prior to the recent export ban and problems associated with CITES enforcement, and investigates potential management strategies, including the establishment of hatcheries, that could be implemented to allow the commercial, legal and sustainable export of giant clam products.*

INTRODUCTION

Milne Bay Province lies at the far eastern tip of Papua New Guinea and is dominated geographically by its marine environment. The province's maritime area is roughly 110 000 km^2, comprising a shoreline of 2120 km and over 600 islands, atolls and reefs (Omeri, 1991) (see Figure 1). Owing to its near equatorial location, Milne Bay Province has an extensive barrier reef system estimated at some 13 000 km^2 or 32% of the national reef area (Munro, 1989; Dazell and Wright, 1986). These reef systems are in close proximity to what is regarded as the epicentre of marine species diversity (an area known as the 'Coral Triangle' which includes Indonesia, Malaysia, the Philippines, southern Japan and northern Australia), and contain some of the most biologically diverse and pristine coral reefs, mangrove forests, and seagrass beds in the world (Allen and Swainston, 1993; Beehler, 1994; Piddington *et al.*, 1997). The majority of the province's approximately 200 000 inhabitants live near the shore, both on the islands and the mainland. The communities are all culturally similar, most are predominantly matrilineal, so that clan membership, territorial rights, and inheritance are determined through the female line. Inhabitants are mostly subsistence and artisanal fishers selling marine resources to exporters and rely mainly on fishing and subsistence agriculture for their food security and livelihoods. Average annual income per household has been estimated at USD130.00 (Kinch, 2001; Mitchell *et al.*, 2001). For many people in remote areas, purchases made by local fishing companies offer the only source of cash. Unfortunately this often leads to over-harvesting of marine resources. The impact and pressure exerted on these resources is likely to increase in the future given the burgeoning population of the province (currently growing at 2.5% per annum), the increasing desire for cash, and the decline in traditional income sources such as copra (the dried, oil-yielding kernel of the

FOR MANY PEOPLE IN REMOTE AREAS, PURCHASES MADE BY LOCAL FISHING COMPANIES OFFER INHABITANTS THE ONLY SOURCE OF CASH. THIS OFTEN LEADS TO OVER-HARVESTING OF MARINE RESOURCES.

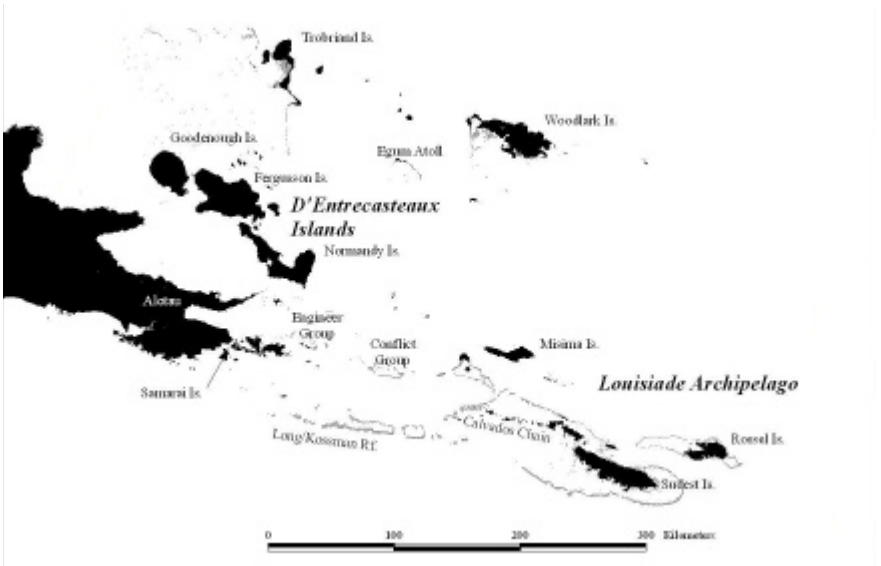


Figure 1. Milne Bay Province >
Reproduced courtesy of CSIRO (Commonwealth Scientific & Industrial Research Organisation)

coconut).

BACKGROUND

Giant clams are classified in the order Cardiacea and the family Tridacnidae (Munro, 1993). Of the nine species of giant clams (Wells, 1997), possibly seven occur in Milne Bay Province. These are Giant Clam *Tridacna gigas* (IUCN-Vulnerable), Southern Giant Clam *Tridacna derasa* (IUCN-Vulnerable), Scaly Clam *Tridacna squamosa* (IUCN-Lower Risk: Conservation Dependent), Small Giant Clam *Tridacna maxima* (IUCN-Lower Risk: Conservation Dependent), Crocus Clam *Tridacna crocea* (removed from the 1996 IUCN Red List), Bear Paw Clam *Hippopus hippopus* (IUCN-Lower Risk: Conservation Dependent) and China Clam *Hippopus porcellanus* (IUCN-Lower Risk: Conservation Dependent).

The first stock abundance estimates for giant clams in Milne Bay Province was carried out by Chesher in 1980 in the south-east of the province. He stated that prior to commercial harvesting, unfished areas of southern Milne Bay Province contained an overall density of 39/ha for all species of giant clams (Chesher, 1980). In 1996, a combined stock assessment by the South Pacific Commission (SPC) and the Papua New Guinea National Fisheries Authority (NFA) was carried out in the Engineer and Conflict Groups of islands. Throughout the survey area *Hippopus hippopus* was the most abundant at 20.1/ha, followed by *Tridacna maxima* at 17.9/ha, *T. crocea* at 11.9/ha, *T. squamosa* at 5.8/ha, *T. derasa* at 5.3/ha, *T. gigas* at 0.4/ha and *Hippopus porcellanus* at 0.3/ha. From extrapolation of these data it was suggested by Ledua *et al.* (1996) that approximately 98% of the stock of *Tridacna gigas* throughout the province had been wiped out since the early 1980s, with overall stock density of all species estimated to be down by 82.35% of the original population. The overall density of all species was estimated to be only 0.5/ha (Ledua *et al.*, 1996).

In the 2000 Marine Rapid Appraisal Program (RAP) conducted by Conservation International (CI), a total of six giant clam species were recorded from 39 sites in Milne Bay Province. The most commonly observed were *Tridacna maxima* (69.2%), *T. squamosa* (56.4%), and *T. crocea* (41%). *Tridacna gigas* only accounted for 3.5% of the total giant clam count (Allen *et al.*, in press). Most *Tridacna* species were small in size, with few large individuals seen. The general impression gained from the RAP team members on this survey was that stocks of these animals are lower than would be considered normal for a comparative reef system of this size and health.

Given the importance of giant clams to the people of Milne Bay Province, a more thorough and comprehensive assessment of Tridacnid stocks is required. A Stock Assessment and Biogeographical Survey (SABS) carried out by CI, the NFA, and the Commonwealth Science and Industry Research Organisation (Kinch *et al.*, 2001; CSIRO, 2001), specifically planned for sea cucumbers, also included giant clams and other sedentary marine species. This survey was conducted during October and November 2001; 1126 sites in Milne Bay Province were surveyed. *Tridacna gigas* abundances ranged from 0-1.32/ha, with a mean density of 0.82/ha. Mean densities for *Tridacna maxima* were at 1.79/ha, *T. derasa* at 0.34/ha, *T. squamosa* at 1.37/ha, *T. crocea* at 14.85/ha and *Hippopus hippopus* at 0.41/ha. The species harvested for commercial use had a mean density of 4.32/ha. The SABS results indicate clearly that stock levels are very low and have been heavily depleted across Milne Bay Province, particularly when compared with the results recorded from the 1996 SPC/NFA abundance survey of the Engineer and Conflict Groups.

BIOLOGY AND STOCK DECLINE

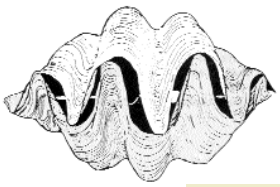
Giant clams are highly vulnerable to stock depletion. It is a feature of giant clam biology that stocks will become non-sustaining when densities fall below certain undefined levels. This is because of their mode of spawning (Lucas, 1988). Giant clams maximize fertilization success by spawning in synchrony in response to current-borne pheromones produced by other spawning individuals belonging to the same species. These chemicals are either contained in, or associated with giant clam eggs. Once detected, a second clam releases sperm and the eggs are thus fertilized. However if there are no conspecific clams downstream, the eggs are unfertilized (Wells, 1997).

Furthermore, if adults are removed over a large area, planktonic larvae might not settle out as readily as in a normal area (Chesher, 1980). This means lower numbers of smaller clams than normal which, in turn, means the existing predators consume a larger percentage of those clams that do settle out. Predators of intermediate-sized clams also exert heavier pressure on their prey as numbers become reduced, resulting in very few clams reaching maturity in a fished area (Chesher, 1980). Govan (1992) lists 45 species of known predators and metazoan parasites.

If a reef is entirely depleted of giant clams, re-population will depend on planktonic larvae brought in from other reefs by prevailing currents. If the reef is isolated or the current direction is unfavourable, the re-establishment of a stock could take hundreds of years (Munro, 1993). Even in dense natural populations of giant clams, recruitment is very sporadic (Adams *et al.*, 1988; Pearson and Munro 1991).

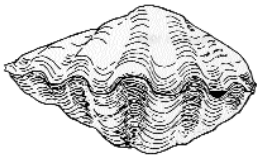
HARVESTING METHODS

Fishing methods for giant clams are simple owing to the shallow distribution, conspicuous appearance and sedentary habit of these bivalves. In Milne Bay Province, small clams are collected opportunistically during reef-gleaning activities and non target-specific fishing, while larger specimens are collected by free diving. The flesh is excised from the shell by slipping a



Giant Clam *Tridacna gigas*

is the largest living shelled mollusc and may weigh over 200 kg, of which 55-65 kg is the weight of the living tissue. The shell may grow to 137 cm in length, is sub-oval to fan-shaped and white, and bears a number of radiating ribs.



Southern Giant Clam *Tridacna derasa*

is the second-largest tridacnid, and is distinguished by its low primary and radial sculpture, variable shape, lack of spiny projections and its white shell. It reaches 51.4 cm or more in length.

Bear Paw Clam *Hippopus hippopus*

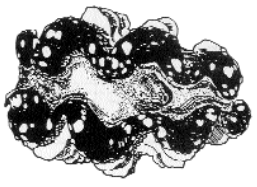
reaches 39.7 cm in length. The shell is elongate to ovate, triangular, or sub-rhomboidal in shape and the valves are heavy and thick, usually coloured with strawberry blotches.

China Clam *Hippopus porcellanus*

has a thinner and smoother shell than that of *H. Hippopus*, usually lacking the strawberry colouration and is more semi-circular in outline. The mantle is olive green colour.

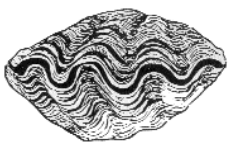
Small Giant Clam *Tridacna maxima*

probably the most widespread of the giant clams, reaches 35-40 cm in length, and has the brightest mantle colouring of all the species. Shell shape and mantle colour are very variable.



Scaly Clam *Tridacna squamosa*

has an elongate shell with about five strong, low, rounded radial ridges, each carrying fluted scales growing large towards the edge of the valve. Mantle colour varies geographically and ranges from brilliant blue, green, purple and brown depending on incident light.



Crocus Clam *Tridacna crocea*

is the smallest giant clam, reaching only 15 cm in length. The valves are greyish-white, often tinged with pinkish-orange or yellow both inside and out, and are usually quite smooth. They are strongly triangularly-ovate in shape.

Description of giant clams extracted from Wells, et al., 1983. Illustrations by B. Lynch. Reproduced from CITES Identification Manual Vol. 3.

knife or sharpened wooden stick along its inner surface to cut one end of the adductor muscle. Sticks are also used to prise *Tridacna maxima* from the reef. Giant clams located in deeper water are hauled to the surface using ropes and chains. The mantle and muscle are then removed and the shell is dropped back into the sea. Previously a local fishing company aided village divers in harvesting giant clams by towing canoes to harvesting sites and winching specimens to the surface from their boats.

Hookah gear (diving equipment that uses air supplied through a line from a surface compressor) has also been used in Milne Bay Province during the last decade.

Poachers and Illegal Buyers

Roe (1961) documents pearling fleets in Junet near Sudest Island in 1888 and it is highly probable that giant clams were being harvested. In the early 1920s several incidences of poaching were beginning to trickle into the colonial administration (Zimmer, 1922-23). The period between 1967-81 saw a sharp increase in the illegal entry into the province of foreign fishermen, with sightings and arrests of numerous long-range Taiwanese fishing vessels (Bartlett, 1975; Potter, 1975; Standing, 1975). This activity reached its peak in the mid-1970s and then subsided in the face of strong international pressures over depleted stocks, and improved surveillance of reef areas (Lucas, 1994). In 1996, there were reports that Asian buyers at Losuia in the Trobriand Islands had illegally purchased more than one tonne (t) of giant clams which were subsequently smuggled to Port Moresby and shipped to overseas destinations mixed with other seafood exports (Lokani, undated).

Commercial Harvesting of Giant Clams

Commercial fisheries for giant clams developed in Milne Bay Province in the wake of the reduction of illegal fishing by Taiwanese vessels and in response to sustained demand. The Milne Bay Fisheries Authority (MBFA) established in 1979 (Munro, 1989) began the export of giant clams from the province in 1983 (Lokani and Ada, 1998).

In 1989, a giant clam biologist working for the International Centre on Living Aquatic Resources Management (ICLARM) visited the MBFA's processing facility and analysed the purchasing records held there. His analysis showed that a total of 85.7 t of adductor muscle had been purchased for export in the period between January 1983 and May 1988 (Munro, 1989).

A ban on the purchase and export of wild-

Year	Species	Details	Quantity (Kg)
1983[1]	*Tridacna* spp.	Giant clam adductor muscle	5 500
1984[1]	*Tridacna* spp.	Giant clam adductor muscle	1 000
1985[1]	*Tridacna* spp.	Giant clam adductor muscle	6 000
1986[1]	*Tridacna* spp.	Giant clam adductor muscle	34 500
1987[1]	*Tridacna* spp.	Giant clam adductor muscle	28 500
1988[1]	*Tridacna* spp.	Giant clam adductor muscle	10 000
1989-1994	**Papua New Guinea bans exports of giant clams**		
1995[2]	*Tridacna* spp.	Giant clam adductor muscle	1 000 (18 000[3])
1996[2]	*Tridacna* spp.	Giant clam adductor muscle	14 005 (14 320[3])
1997[2]	*Tridacna* spp.	Giant clam adductor muscle	10 650
1997[2]	*Tridacna* spp	Unprocessed giant clam shell	16 000
1998[2]	*Tridacna* spp.	Giant clam adductor muscle	13 560
1999[2]	*Tridacna* spp.	Giant clam adductor muscle	8 900
2000-	**An infringement of licensing conditions resulted in a ban on the purchase and export of giant clams**		

Table 1. Giant clam exports from Milne Bay Province, 1983-2000.

Sources: [1]Munro, 1989; [2]National Fisheries Authority Marine Exports Records. (Note records are not complete for 1995 and 1996. Figures for 1995 and 1996 are thought to be lower than the actual figure as there had been illegal buying of giant clam muscles which were being transferred to Port Moresby (Lokani, undated); [3]Ledua et al., *1996.*

caught giant clam meat in May 1988 (lifted in May 1995 but reinstated in 2000) had allowed for some regeneration of giant clam stocks, which provided an incentive for a local fishing company to commence harvesting and exports. This company has been criticized by several government officers in the past over its operations (Sailoia, 1996; Merpe, 1996). This criticism was partly levelled at the wastage of clam meat which was being discarded because the company was only interested in purchasing clam shells for export in 1997. Sixteen tonnes of shells were exported that year and, until recently, piles of giant clam shells could be found stacked around Alotau.

During 1998 and 1999, the local fishing company was purchasing two sizes of giant clam muscle based on weight. A kilogramme of specimens, each weighing under 400 g, earned 6 kina (USD1.6), and a kilogramme of specimens weighing more than 400 g fetched 10 kina (USD2.7). From January to the end of September 1999, the fishing company purchased 697 kg of giant clam muscles - mostly *Tridacna gigas* and *T. derasa* - from Brooker Islanders. This was broken down into 551 kg (or 1970 clams) of specimens under 400 g earning 3306 kina (USD915), and 146 kg (or 170 clams) earning 1460 kina (USD404) (Kinch, 1999). Village people distinguish between mature and immature *T. gigas* and have separate names for them: of all the *T. gigas* specimens that were harvested, almost a third of the animals were not full-grown adults.

Giant clams do not withstand sustained commercial fishing pressure and perceptions now amongst villagers is of reduced numbers of giant clams and other marine resources, notably sea cucumbers. As early as 1980, the Department of Primary Industries had recommended that commercial fishing for giant clams should not be part of the MBFA Coastal Zone Development Program, and advised that they be farmed instead (Chesher, 1980). Ledua *et al.* (1996) also noted that the density of giant clams from the SPC-NFA research was so low that a total ban on the commercial fishing of giant clam species was warranted.

Currently, there are no commercial giant clam farms in Papua New Guinea.

EXPORTS

There is a long traditional history of giant clam use in the South Pacific, where they are an important source of food; some of these countries also export the meat and shells (see Sant, 1995). Papua New Guinea exported substantial amounts of giant clam meat during the 1980s (Table 1), as did Fiji. There are, however, only limited data on the harvesting and export of this commodity in the South Pacific. CITES has proven useful in monitoring the trade to and from CITES member countries, but, with the exception of Papua New Guinea and Vanuatu, all countries in the South Pacific are not party to CITES (Sant, 1995).

Internationally, giant clams are used commercially as aquarium specimens, seafood, including sashimi, shells and shellcraft. The majority of international trade is in giant clam adductor muscle and shells (Wells *et al.*, 1983; Wells, 1997) and this has been the focus of the commercial trade in Milne Bay Province. The adductor muscle tissue is highly prized by Chinese gastronomes for its purported aphrodisiac properties (Lucas, 1988). The level of exploitation is induced by the lucrative prices paid by Asian markets and there is a direct link between the threats to Papua New Guinea's marine resources and the proximity of these affluent and growing markets.

In May 1988, the purchase and export of wild giant clams was banned by the Department of Environment and Conservation (DEC). This ban was lifted in 1995 on the understanding that a management plan for the sustainable harvest of giant clams was in place. Although the Milne Bay Province Giant Clam Fishery Management Plan had been drawn up by the NFA it was

never gazetted owing to confusion between the NFA and the DEC over responsibility for the enforcement of the plan and because of opposition from commercial and political interests. Within the first six months of the ban being lifted in 1995 a local fishing company exported approximately 18 t of adductor muscle (Ledua *et al.*, 1996).

During the 1990s, and after the ban had been lifted, clam shells were primarily exported to Australia, and Singapore was the main recipient of the province's clam muscles.

In 2000, the export of all giant clam products in Milne Bay Province was again stopped when it was found that the aforementioned local fishing company had stated on CITES export permits that its products were from farmed clams when in fact they were of wild specimens. The company had originally been given a licence for export on the understanding that their product was being farm-reared. The export ban remains in place.

CITES

Giant clams have been listed in CITES Appendix II since 1985 (Wells, 1997). Species listed in Appendix II are deemed not currently threatened with extinction but are at risk of becoming so unless trade is regulated (Wijnstekers, 1995). International trade is permitted in CITES Appendix II-listed species provided appropriate export permits are issued (Wells, 1997). All living or dead clams, including all readily recognizable parts and derivatives, are subject to the treaty's provisions for Appendix II species (Wells, 1997).

Papua New Guinea enforces stricter legislation than is required under CITES, of which the country has been a Party since 1976 (Wells, 1997). The country's *Fauna Act* has no provisions for the international trade in protected fauna but relies on the *Customs Act*, which stipulates that the export of any fauna without a permit is an offence. The export of wild giant clams from Papua New Guinea, however, is prohibited.

Each CITES Party is required to designate one or more Management Authority to be responsible for administering the Convention and one or more Scientific Authority to advise on scientific and technical issues, including assessments of the threat that may be posed to species by international trade. Parties must establish legislation that prohibits international trade in specimens in violation of the Convention, that penalizes such trade, and allows for confiscation of specimens illegally traded or possessed (Armstrong and Crawford, 2000). In classifying species and determining whether the populations are robust enough to be traded internationally, the Scientific Authority determines, through scientific procedure, whether international trade will jeopardize the survival of the species (Armstrong and Crawford, 2000). Because of the listing of giant clams under CITES, the DEC assumed responsibility for export regulation, which caused confusion amongst the NFA because traditionally it has jurisdiction over the export of fresh marine resources and was the agency responsible for management.

CONSERVATION AND MANAGEMENT MEASURES

In order to ensure the sustainability of all marine resources including giant clams in Milne Bay Province, effective management strategies must be implemented. Several approaches to assist the recovery of overfished giant clam populations have been proposed. These include the establishment of Marine Protected Areas (MPAs), concentrating the remaining adult clams so that their reproduction can be facilitated by their closer proximity; and, seeding cultured giant clams of sufficient size or in sufficient numbers and releasing these into the field to produce adult populations (Lucas, 1994; Tisdell, 1992). The imposition of a ban on further commercial fishing or strict harvesting quotas, to be harvested in a single short season, coupled with the size restrictions, could also offer prospects for management.

Owing to the low natural mortality rates of giant clams, the largest yields will be obtained by taking giant clams at relatively large sizes. Thus it would also be possible to stipulate minimum sizes of giant clam adductor muscles and corresponding shell lengths and body weights for each species as the value of adductor muscle increases with increasing size (Munro, 1993; Tisdell, 1992; Bell *et al.*, 1994; Bell and Gervis, 1994). Chesher (1980) offered size limits for the commercial harvest of giant clams in the province: at between 45-65 cm across the widest part of the shell for *Tridacna gigas* specimens and 30-55 cm for *T. derasa*. An indication of the growth parameters and estimates for tridacnid species in Papua New Guinea is outlined in Table 2.

The objectives outlined in the ungazetted Milne Bay Province Giant Clam Fishery Management Plan were to manage the wild population of giant clams and to main-

Species	Shell length in cm by age in years									
	1	2	3	4	5	6	8	10	15	20
Tridacna gigas[1]	4.80	13.97	22.02	29.09	35.29	40.74	49.73	56.66	67.82	73.64
Tridacna gigas[1]	4.80	12.73	20.00	26.67	32.78	38.38	48.22	56.49	71.84	81.77
Tridacna squamosa	4.75	9.16	12.99	16.32	19.22	21.74	-	-	-	-
Tridacna maxima	2.08	5.09	7.78	10.19	12.34	14.27	-	-	-	-
Hippopus hippopus	5.04	11.75	17.17	21.55	25.09	27.95	-	-	-	-

Table 2. Compilation of growth parameters and estimates for tridacnid species in Papua New Guinea.
[1]*Tridacna gigas* recorded from two different parts of Papua New Guinea. *Source: Munro (1993)*

tain the fishery at an economically sustainable level. Fishing restrictions under this Plan stated that fishing for giant clams was to be restricted to free diving (ie. no hookah or scuba). The use of mechanical fishing methods such as ropes with hooks were also not to be used and all fishing was to be carried out from small boats to a maximum of 40 HP outboard (National Fisheries Authority, 1996).

Marketing restrictions under the Plan stated that giant clam products should meet all CITES conditions of export, with all exports inspected and certified by a CITES inspector. All adductor muscles destined for export should be declared as adductor muscle, and all giant clam products destined for export shall state whether raised from a farm or harvested from the wild (National Fisheries Authority, 1996).

The establishment of MPAs or refuges for giant clams and other threatened species can be advocated for all areas where stocks are depleted (Braley, 1994; Munro, 1993; Lucas, 1994; Mitchell *et al.*, 2001; Wells, 1997). The Milne Bay Community-Based Coastal and Marine Conservation Program (CMCP) is currently being augmented between a multiple of partners which include CI, the United Nations Development Program, the Global Environment Facility and all levels of provincial and national government. The CMCP will establish Community-Based Marine Management and Conservation Areas in high biodiversity locations for which community-based resource management (CBRM) is socially and economically feasible. The use of CBRM is deemed instrumental in the success of conservation and management initiatives of marine resources. These efforts will be complemented and supported by appropriate marine resource use policy changes covering all of Milne Bay Province, and targeting institutional capacity building of the Local Level Governments and Ward Development Committees. It is hoped these local government and community-level measures will lead to the recovery and long-term sustainability of currently over-harvested species (such as giant clams), and will help ensure that other marine species will not be over-exploited as markets develop and/or local human populations increase.

Restocking appropriate reef environments with cultured giant clams is the most direct method of population enhancement. Villagers have already been doing this to a certain extent but for subsistence rather than conservation or management purposes: juveniles or subadults are collected and placed in secret locations or on the foreshore reefs outside the villagers' houses where they can be harvested as needed (McLean, 1978; Kinch, 1999; Wells, 1997). Because giant clams have larval stages that are typical of bivalved molluscs, they lend themselves to hatchery methods that have been developed for other commercial bivalves, e.g. oysters and scallops. Giant clams may be cultured in the shallow subtidal zone, on and off the bottom in the intertidal zone, and in floating structures and by virtue of their symbiotic relationship with a species or species group of dinoflagellate algae, they are the only self-feeding farm animals in the world (Munro, 1993). Crawford *et al.* (1988) recognizes four phases in the culture of giant clams: the hatchery phase, where larvae are reared from eggs in tanks; the nursery phase, where juveniles are reared in onshore tanks from metamorphosis (0.2 mm shell length) to about nine months of age and 20+ mm shell length ('seed' clams); the ocean-nursery phase, where juvenile clams are further raised in protective containers in the sea to a shell length of 200+ mm shell length; and the grow-out phase, where giant clams are left to grow out to harvestable size (see also Calumpong, 1992; Braley, 1992; Usher and Munro, 1988).

It should be noted that there are social and economic risks involved as clam farming requires high capital outlays by village standards. Its establishment at the village level in Milne Bay Province would need support from the NFA, the CMCP and other international agencies. Hazards include exposure to storms (Calumpong and Solis-Duran, 1993) and mortality from parasites and predators (Govan, 1992). In well-sited ocean nurseries most giant clam mortality will be due to these predators and parasites and considerable effort may be placed on villagers to ensure adequate levels of survival for giant clam spats through extra maintenance and care. Considerable research has been carried out in the Solomon Islands into improving survival rates of giant clams under village farms (Bell, 1999; Hambrey and Gervis, 1993). Lucas (1994) and Tisdell *at al.* (1994) also sug-

gest that large quantities of new product are needed to test potential markets, and these must then be available to supply the markets; there is, however, a high financial risk in producing large quantities without established marketing agreements. This is not a real issue in Milne Bay Province, which is one of the last areas within the Coral Triangle with adequate reefs and the previous volume of exports indicates readily available markets.

Although commercial farming of giant clams is currently not practiced in Milne Bay Province, there was previously a clam 'ranch' owned by a local entrepreneur in the Engineer Group which is no longer in operation. As noted earlier, stocks of giant clams in the Engineer Group are now depleted (Ledua *et al.*, 1996).

Presently, there is a proposal under consideration to build a clam hatchery at Nivani Island in the Deboyne Islands. The owners of this company also own the freehold title on this island and plan to set up a breeding and grow-out facility for giant clams. When the clams are at a size for translocation they will be distributed or sold to villagers around the area with instructions on how to care for them. After a period of three years the company would purchase the clams back from the villagers, whilst selling out more. A hatchery for Gold-lip Pearl Oyster *Pinctada maxima* has also been proposed by a pearl farming company which could also be used for the rearing of giant clam spats.

IF THE REEF IS ISOLATED OR THE CURRENT DIRECTION IS UNFAVOURABLE, THE RE-ESTABLISHMENT OF A GIANT CLAM STOCK COULD TAKE HUNDREDS OF YEARS

Conclusions and Recommendations

The low stocks of some giant clam species in Milne Bay Province are a reflection of previous unsustainable practices from commercial use, poaching and subsistence harvesting. Thus, there is an urgent need to develop means of conserving and ensuring the recovery of giant clam populations in the province. The prospect of culturing giant clams could be considered but exploitation pressure has to be limited to allow giant clam stocks to maintain their stability and regenerative capacity. The most appropriate management for giant clams and other marine resources would be to encourage management and control over reefs by local communities. This would form a cost-effective means of managing a resource, by which local communities enforce management regimes, which is the aim of the CMCP. The information obtained from the SABS will also assist in helping local communities in designing appropriate management areas and strategies.

Hatcheries in Milne Bay Province could provide alternative opportunities for small island communities in suitable ecological locations to earn an income. They could reduce pressure from overfishing and unsustainable harvests of other marine products and add value and provide incentives to keep reef systems and associated nearshore environments intact. The cost-benefit that could be realized by local communities through the ocean grow-out of juveniles produced in hatcheries appears an option worth pursuing. This would of course need to be subsumed under CBRM regimes.

Finally, the Milne Bay Giant Clam Fishery Management Plan needs to be reconsidered by the NFA and special attention given to addressing the capacity-building needs of the National Departments of the OEC and the NFA. The conflict and confusion between the fisheries and environmental legislation should be addressed and improvements made to the monitoring, recording, and reporting as a component of Papua New Guinea's national CITES permit regulation and reporting.

Milne Bay Province previously specialized in the export of adductor muscles as a food product to the Asian region and these markets are still readily available. Once community-based and managed farms are in place, resumption of giant clam exports could be reconsidered.

Acknowledgements

Thanks are owed to Garry Preston, consultant to the National Fisheries Authority, Papua New Guinea, Sue Wells, IUCN-Eastern Africa Regional Office, and Elizabeth Wood, of the Marine Conservation Society, for their helpful comments on an early draft of this manuscript. James Compton and Glenn Sant of TRAFFIC Oceania also provided comments on the article and supported its

Photographs above:

<<< pile of Giant Clam *Tridacna gigas* shells awaiting export, Alotau;
<< the adductor muscle of a Giant Clam being brought to the water's surface;
< some 70 kg of giant clam *Tridacna* adductor muscle which was later discarded because it had perished.

Photographs: Jeff Kinch

inclusion in the *TRAFFIC Bulletin*. For further reading on this subject, please refer to Sant, 1995.

REFERENCES

Adams, T., Lewis, A. and Ledua, E. (1988). The natural population dynamics of *Tridacna derasa* in relation to reef-reseeding and mariculture. In: Copland, J. and Lucas, J. (eds). *Giant Clams in Asia and the Pacific*. ACIAR Monograph 9. Australian Centre for International Agricultural Research, Canberra, Australia.

Allen, M., Kinch, J. and Werner, T. (in press). A basic stock assessment of the coral reef resources of Milne Bay Province, Papua New Guinea, including a study of utilization at the artisanal level. In: Allen, G., Kinch, J. and McKenna, S. (eds). *A Rapid Biodiversity Assessment of the Coral Reefs of Milne Bay Province, Papua New Guinea - Survey II*. RAP Working Papers. Conservation International, Washington, DC, USA.

Allen, G. and Swainston, R. (1993). *Reef Fishes of New Guinea.* Madang: Christensen Research Institute.

Armstrong, J. and Crawford, J. (2000). *Convention on International Trade in Endangered Species of Wild Fauna and Flora*. Paper presented at World Coral Reefs in the New Millennium: Bridging Research and Management for Sustainable Development. The Ninth International Coral Reef Symposium 23-27/10/2000, Bali, Indonesia.

Bartlett, J. (1975). *Taiwanese Fishing Boats.* Situation Report 4 of 1974/75, Misima District, Bwagaioa, Misima, Milne Bay Province, Papua New Guinea.

Beehler, B. (1994). The global benefits of conservation in Papua New Guinea. In: Sekhran, N. and Miller, S. (eds). *Papua New Guinea Country Study on Biological Diversity.* Pp. 37-40. Department of Environment and Conservation, Port Moresby, Papua New Guinea.

Bell, J. (1999). Reducing the costs of restocking giant clams in the Solomon Islands. *Coral Reefs* 18:326.

Bell, J., Fa'anunu, U., Koloa, T. (1994). *Kingdom of Tonga: Fisheries Resources Profile.* Report 94/5. Forum Fisheries Agency, Honiara, Solomon Islands.

Bell, J. and Gervis, M. (1994). *Aquaculture Potential on Niue.* Report 94/15. Forum Fisheries Agency, Honiara, Solomon Islands.

Braley, R. (ed.) (1992). *The Giant Clams: A Hatchery and Nursery Culture Manual*. ACIAR Monograph 15. Australian Centre for International Agricultural Research, Canberra, Australia.

Braley, R. (1994). The importance of aquaculture and establishment of reserves for the restocking of giant clams on over-harvested reefs in the Indo-Pacific region. In: *Proceedings of the World Fishery Congress (1994)*, held in Rome, Italy, 1992.

Calumpong, H. (ed.) (1992). *The Giant Clams: An Ocean Culture Manual.* ACIAR Monograph 16. Australian Centre for International Agricultural Research, Canberra, Australia.

Calumpong, H. and Solis-Duran, E. (1993). Constraints in restocking Philippine reefs with giant clams. In: Fitt, W. (ed.). *Biology and Mariculture of Giant Clams.* ACIAR Monograph 47. Pp. 94-98. Australian Centre for International Agricultural Research, Canberra, Australia.

Chesher, R. (1980). *Stock Assessment: Commercial Invertebrates of Milne Bay Coral Reefs*. Report prepared for the Fisheries Division, Department of Primary Industries, Port Moresby, Papua New Guinea.

Crawford, C., Lucas, J. and Nash, W. (1988). Growth and survival during the ocean-nursery rearing of Giant Clams, *Tridacna gigas*: assessment of four culture methods. *Aquaculture* 68:103-113.

CSIRO (2001). *Research for Sustainable Use of Beche-de-mer Resources in the Milne Bay Province, Papua New Guinea.* Research Proposal to the Australian Centre for International Agricultural Research, Sydney, New South Wales, Australia.

Dazell, P. and Wright, A. (1986). An assessment of the exploitation of coral reef fishery resources in Papua New Guinea. In: McLean, J., Dizon, L. and Hosillos, L. (eds). *The First Asian Fisheries Forum.* Asian Fisheries Society. Manila, Philippines.

Govan, H. (1992). Predators and predator control. In: Calumpong, H. (ed.). *The Giant Clams: an Ocean Culture Manual.* ACIAR Monograph 16:41-49. Australian Centre for International Agricultural Research, Canberra, Australia.

Hambrey, J. and Gervis, M. (1993). The economic potential of village-based farming of Giant Clams (*Tridacna gigas*) in the Solomon Islands. In: Fitt, W. (ed.). *The Biology and Mariculture of Giant Clams.* ACIAR Monograph 47:138-146. Australian Centre for International Agricultural Research, Canberra, Australia.

Kinch, J. (1999). *Economics and Environment in Island Melanesia: A General Overview of Resource Use and Livelihoods on Brooker Island in the Calvados Chain of the Louisiade Archipelago, Milne Bay Province, Papua New Guinea.* A Report prepared for Conservation International, Port Moresby, National Capital District, Papua New Guinea.

Kinch, J. (2001). *Social Feasibility Study for the Milne Bay Community-Based Coastal and Marine Conservation Program.* A report to the United Nations Milne Bay Community-Based Coastal and Marine Conservation Program, PNG/99/G41, Port Moresby, Papua New Guinea.

Kinch, J., Mitchell, D. and Seeto, P. (2001). *Information Paper for the Milne Bay Province Wide Stock Assessment and Biogeographical Survey.* A report prepared for Conservation International, Washington, DC, USA.

Ledua, E., Matoto, S., Lokani, P. and Pomat, L. (1996). *Giant Clams Resource Assessment in Milne Bay Province.* Report prepared by the South Pacific Commission and the Department of Fisheries and Marine Resources, Port Moresby, Papua New Guinea.

Lokani, P. (undated). *Management and Development of the Giant Clam Fishery in Milne Bay Province.* A Draft Report prepared for the National Fisheries Authority, Port Moresby, Papua New Guinea.

Lokani, P. and Ada, K. (1998). *Milne Bay Province: Product Exports-1997.* Report to National Fisheries Authority, Port Moresby, Papua New Guinea.

Lucas, J. (1988). Giant clams: description, distribution and life history. In: Copland, J. and Lucas, J. (eds). *Giant Clams in Asia and the Pacific.* ACIAR Monograph 9:21-33. Australian Centre for International Agricultural Research, Canberra, Australia.

Lucas, J. (1994). The biology, exploitation, and mariculture of giant clams (Tridacnidae). *Reviews in Fisheries Science.* 2(3):181-223.

McLean, J. (1978). The clam gardens of Manus. *Harvest* 4:160-163.

Merpe, E. (1996). *Mass Harvest of Clam Shells - Rossel/Sudest Islands.* Letter from Officer-in-Charge, Patrol Post Pambwa - Rossel Island, Division of District and Village Affairs to Assistant Secretary, Division of Fisheries and

Marine Resources, Alotau, Milne Bay Province, Papua New Guinea.

Mitchell, D., Peters, J., Cannon, J., Holtz, C., Kinch, J. and Seeto, P. (2001). *Sustainable Use Options Plan for the Milne Bay Community-Based Coastal and Marine Conservation Program.* A report to the United Nations Milne Bay Community-Based Coastal and Marine Conservation Program, PNG/99/G41, Port Moresby, Papua New Guinea.

Munro, J. (1989). *Development of a Giant Clam Management Strategy for the Milne Bay Province*. Report to the Department of Fisheries and Marine Resources, Port Moresby, Papua New Guinea.

Munro, J. (1993). Giant clams. In: Wright, A. and Hill, L. (eds). *Nearshore Marine Resources of the South Pacific: Information for Fisheries Development and Management.* Pp. 431-449. Forum Fisheries Agency, Honiara, Solomon Islands.

National Fisheries Authority (1996). *Milne Bay Province Giant Clam Fishery Management Plan.* Draft Management Plan for the Government of Papua New Guinea, Port Moresby, Papua New Guinea.

Omeri, N. (1991). *Fisheries and Marine Policy for Milne Bay Province.* Report prepared for the Department of Fisheries and Marine Resources, Port Moresby, Papua New Guinea.Pearson, R. and Munro, J. (1991). Growth, mortality and recruitment rates of giant clams, *Tridacna gigas* and *T. derasa*, at Michaelmas Reef, Central Great Barrier Reef, Australia. *Australian Journal of Marine and Freshwater Reserves* 42:241-262.

Piddington, K., Baines, G., Barry, G. and Huber, M. (1997). *Environment Programming Mission to Papua New Guinea.* Report prepared for the United Nations Development Program, Port Moresby, Papua New Guinea.

Potter, A. (1975). *Reports of Taiwanese Fishing Boats at Rossel Island.* Situation Report 2 of 1975/76; Louisiade Local Level Government Council, Milne Bay Province, Papua New Guinea.

Roe, M. (1961). *A History of South-east Papua to 1930*. PhD thesis. The Australian National University, Canberra, Australia.

Sailoia, P. (1996). *Wastage of Clam Meat.* Letter from Acting District Manager, Bwagaioa, Misima, to Division Secretary, Division of Fisheries and Marine Resources, Alotau, Milne Bay Province, Papua New Guinea.

Sant, G. (1995). *Marine Invertebrates of the South Pacific: an Examination of the Trade*. TRAFFIC International.

Standing, J. (1975). *Taiwanese Fishing Vessels.* Situation Report 1 of 1975/76, Louisiade Local Level Government Council, Milne Bay Province, Papua New Guinea.

Tisdell, C. (ed.) (1992). *Giant Clams in the Sustainable Development of the South Pacific.* ACIAR Monograph 18. Australian Centre for International Agricultural Research, Canberra, Australia.

Tisdell, C., Shang, Y. and Leung, S. (eds) (1994). *Economics of Commercial Giant Clams Mariculture.* ACIAR Monograph 15. Australian Centre for International Agricultural Research, Canberra, Australia.

Usher, G. and Munro, J. (1988). ICLARM coastal aquaculture centre: current facilities and progress. In: Copland, J. and Lucas, J. (eds). *Giant Clams in Asia and the Pacific.* ACIAR Monograph 9:106-109. Australian Centre for International Agricultural Research, Canberra, Australia.

Wells, S. (1997). *Giant Clams: Status, Trade and Mariculture, and the Role of CITES in Management.* IUCN, Gland, Switzerland, and Cambridge, UK. ix+77pp.

Wells, S., Pyle, R. and Collins, N. (1983). Giant clams. *The IUCN Invertebrate Red Data Book.* Pp. 97-107. IUCN, Gland, Switzerland, and Cambridge, UK.

Wijnstekers, W. (1995). *The Evolution of CITES: A Reference to the Convention on International Trade in Endangered Species of Wild Fauna and Flora.* CITES Secretariat, Geneva, Switzerland.

Zimmer, G. (1922-23). Misima patrol report for the Calvados Chain and Sudest for the purpose of investigating the alleged poaching of Japanese fishing boats, and to issue seed rice to the native plantation, under the NPO Bwagaoia, Misima District Office.

Jeff Kinch, *Anthropology Department, University of Queensland, Australia. Currently employed by Conservation International as their Community Development and Artisanal Fisheries Specialist.*

Contact address: *Conservation International, PO Box 804, Alotau, Milne Bay Province, Papua New Guinea.*

The sources of information upon which the cases below are based are cited at the end of each country section.

ERRATUM

In Vol. 19 No. 1, the Anti-Drug Group (GAD) was incorrectly credited with the seizure, in October 2000, of wildlife items from antique shops in Brussels, Belgium. We should like to point out that this case was in fact handled by the Customs Investigation Branch, Brussels.

TRAFFIC Europe

EUROPE

RUSSIA

On 28 April 2002, Federal Security Service agents ambushed a jeep attempting to cross into China near the Pogranichny district of Primorsky Krai and seized 18 Asiatic Black Bear *Ursus thibetanus* (CITES I) cubs. The bears had been drugged, wrapped in burlap and hidden in apple crates; one cub died from an overdose. The driver and the commander of the border outpost that oversees the area where the incident occurred were detained.

The cubs were reportedly to be sold to a farm in China for extraction of bile from their gall bladders for use in traditional medicine. Following the seizure, the cubs were to be sent to a rehabilitation centre and would later be released back into the Russian taiga.

TRAFFIC Europe; Associated Press

UK

On 11 January 2002, at Uxbridge Magistrates' Court, Richard Lincoln John Butler of London was found guilty of illegally importing reptiles into the UK at Gatwick Airport, from Orlando, USA. He was convicted on seven charges of knowingly importing live reptiles listed as an endangered species without an import permit. The species were identified as one Harlequin Monitor *Varanus rudicollis*, four Dumeril's Monitors *Varanus dumerilli*, two Bell's Dabb Lizards *Uromastyx acanthinura*, one Argentine Teju *Tupinambis rufescens* and four Ball Pythons *Python regius*. Accompanying these CITES II-listed species was a non-CITES snake identified as *Dasypeltis atra* which was seized because it had been included in an illegal consignment.

Two of the charges of knowingly having acquired possession of goods subject to a restriction on importation of reptiles listed as an endangered species with intent to evade restrictions on importation relate to two Banded Tegus *Tupinambis teguixin* and one Argentine Teju *Tupinambis rufescens* (both CITES II) which were found during a search of Butler's premises.

In sentencing, Butler was given a reduced penalty owing to his financial situation and fined GBP50 per charge (GBP350 in total) (USD511) and GBP250 towards costs.

In the longest sentence ever to be imposed in the UK for a wildlife trade offence, on 18 January 2002, at Isleworth Crown Court, Raymond Humphrey of King's Lynn was gaoled for six and a half years following his conviction for smuggling, keeping and trading in rare birds. Humphrey was arrested at Heathrow Airport on 25 July 2000 after arriving to meet Thai national Peera Jungthirapanich and Wayne Standley of Abbots Langley, Hertfordshire, who had both flown in from Bangkok. In their luggage, Customs officers found 23 birds in 15 cm-diameter plastic tubes, their feet bound with tape; six had perished and most of the surviving birds were in a poor condition. None can be returned to the wild. The species (all CITES II) were: two Asian Barred Owlets *Glaucidium cuculoides*; two Mountain Hawk-Eagles *Spizaetus nipalensis*; one Brown Wood Owl *Strix leptogrammica*; one Pied Harrier *Circus melanoleucos*; five Brahminy Kites *Haliastur indus*; one Eastern Marsh-Harrier *Circus spilonotus*; one Forest Eagle-Owl *Bubo nipalensis*; two Oriental Bay-Owls *Phodilus badius*; one Harrier *Circus*; one Brown Fish-Owl *Ketupa zelonensis*; three Malay Fish-Owls *K. ketupa*; one Indian Black Eagle *Ictinaetus malayensis*; and, one Barred Eagle Owl *Bubo sumatranus*.

Customs and police officers subsequently searched Humphrey's premises in Norfolk and seized a Buff-cheeked Gibbon *Hylobates [=Nomascus] gabriellae* (CITES I); seven Slow Lorises *Nycticebus coucang* (CITES II); five tortoises, one of which was dead; two Goffin's Cockatoos *Cacatua goffini* (CITES I) and the following CITES II-listed birds: three Black Kites *Milvus migrans*; six Changeable Hawk-Eagles *Spizaetus cirrhatus*; four Crested Serpent-Eagles *Spilornis cheela*; one African White-backed Vulture *Gyps africanus*; four Brahminy Kites; one Blyth's Hawk-Eagle *Spizaetus alboniger*; two Red Bellied Macaws *Ara manilata*; one Philippine Serpent Eagle *Spilornis holospilus*; and, one hawk. Dead birds and a dead Slow Loris which were found in the freezer were also seized.

All three suspects were charged with being knowingly concerned in the fraudulent evasion of a restriction on the importation of goods, contrary to section 170(2) of the *Customs and Excise Management Act 1979*. Further charges relating to possession of and sale of prohibited specimens were brought against Humphrey only, to which he pleaded not guilty.

Jungthirapanich was sentenced to 22 months' imprisonment for his part in the smuggling. Standley was found not guilty to his one charge and acquitted.

The case - known as Operation Retort - is the biggest joint investigation of UK police and Customs into wildlife trade.

A six-year gaol term > has been imposed for offences including the attempted smuggling of birds into the UK from Bangkok;

African Dwarf Crocodiles (below), on route from Nigeria to South Korea, were recently seized in the UK.

HM CUSTOMS & EXCISE

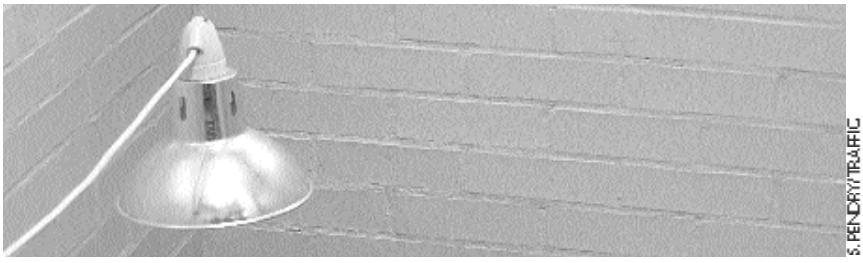
On 14 July 2002, at Heathrow Airport, 10 African Dwarf Crocodiles *Osteolaemus tetraspus* (CITES I) were discovered by Customs officers inspecting a shipment in transit from Nigeria to South Korea. Twelve Royal Pythons *Python regius* (CITES II) and 13 monitor lizards *Varanus* spp. (CITES I/II) were among 95 other reptiles in the consignment. Documents alleging that the reptiles were genuine exports from Benin and claiming the crocodiles to be of common species that had been farmed, had been forged. The crocodiles were cared for at the Animal Reception Centre at Heathrow. Four specimens subsequently died from internal injuries incurred from hooks with which they appear to have been caught and which were still lodged in their bodies. The remaining six were sent to breeding centres in the UK and France.

HM Customs & Excise, CITES Team, Heathrow Airport

AFRICA

SOUTH AFRICA

On 28 November 2001, at Johannesburg International Airport, an official of the Directorate of Nature Conservation of Gauteng's Provincial Government's Department of Agriculture, Conservation, Environment and Land Affairs detained two Czech males after they attempted to export endangered cycad *Encephalartos* seeds and various invertebrates to the Czech Republic via the UK. The sus-



S. PENDRY/TRAFFIC

pects' luggage contained various traps, containers and equipment used for the capture of small mammals and reptiles, as well as cycad seeds, live giant land snails *Achatina*, and other invertebrates, all of which were seized. The specimens had been collected without approval or permits from sites in the Eastern Cape, Western Cape, Northern Cape, KwaZulu-Natal and the North West Province.

One of the suspects, Tomas Pes, was charged with "prohibited acts with endangered species" and paid an admission of guilt fine of ZAR1500 (USD147). The suspect was released and has returned to the Czech Republic. The second suspect was released without charge.

All the invertebrates were donated to the Transvaal Museum (Northern Flagship Institute) for a live public display; the other items were forfeited to the State.

On 30 April 2002, following a ten-month investigation, Arnold Maurice Bengis, chairman of Hout Bay Fishing Industries (Pty) Ltd, pleaded guilty to 28 charges of contravening the *Marine Living Resources Act*. He admitted that between 1999 and 2001 the company had knowingly and intentionally participated in the overfishing of Rock Lobster *Jasus lalandii* and Hake *Merluccias capensis*. A director of the company, Colin van Schalkwyk, pleaded guilty to 301 charges of corruption relating to the bribing of fisheries inspectors.

The discovery of a refrigerated container in Cape Town harbour by officials of the Department of Environmental Affairs and Tourism (DEAT) in June 2001, led to the intensification of investigations into the company's activities. The container, which was to be shipped to the USA by Hout Bay Fishing Industries, was found to contain 17 859 kg of Rock Lobster tails and 2844 kg of Patagonian Toothfish *Dissostichus eleginoides*.

Under the terms of a plea bargain, Hout Bay Fishing Industries will forfeit the fishing vessel *Sandalene* and the contents of the container to DEAT. The total penalty imposed on Hout Bay Fishing Industries amounts to ZAR40 million (USD3.8 m), including ZAR750 000 to DEAT for legal costs that have been incurred by the Department in various High Court matters relating to the case. Mr van Schalkwyk received a sentence of ZAR1 million, or five years' imprisonment, and a five-year suspended sentence.

This is the first occasion that the extensive powers contained in the *Marine Living Resources Act* have been invoked in full.

The investigation was conducted by a multi-disciplinary task team comprising officials from the Directorate of Special Operations (Scorpions), DEAT, the South African Revenue Service and the Asset Forfeiture Unit, and spanned a number of continents.

Department of Agriculture, Conservation, Environment and Land Affairs, Gauteng Province Press Release, 30 November 2001; Ministry of Environmental Affairs and Tourism Media Release, 30 April 2002

ASIA

EAST ASIA

CHINA

On 25 July 2001, one of the country's largest-ever seizures of wildlife products was discovered when two lorries with false military registration number plates were stopped by border police at Tiandu Town in Sanya City, Hainan Province. Inside the vehicles were 566 Water Monitors *Varanus salvator* (CITES II), 259 Asiatic Rock Pythons *Python molurus* (CITES I/II), five pangolins *Manis*, 168 Asian Cobras *Naja naja* (CITES II), and 2956 Chinese Rat Snakes *Ptyas korros*. Four people were arrested.

On 29 July 2001, Huang Huaqiu was sentenced to death, postponed for two years, for smuggling 44 live Saker Falcons *Falco cherrug* (CITES II) into the country at Tianjin International Airport on 13 September 2000. His personal property was also ordered confiscated. Wang Yuhua and Zhang Ying were both sentenced to life imprisonment for their part in the incident, and their personal property was also ordered to be confiscated. Two former policemen at the airport, Zuo Xiguang and Fen Jianghong were sentenced, respectively, to 15 years' and 13 years' imprisonment and both were fined USD5890.

S. PENCRYTRAFFIC

In China, one man has been sentenced to death and two others to life imprisonment for illegally importing Saker Falcons.

On 8 August 2001, armed soldiers at the Manhai Inspection Station in Baoshan, Yunnan, seized animal skins from a lorry used for transporting dried fish skins. They included 23 pieces of Tiger *Panthera tigris* (CITES I) skin, 33 pieces of Leopard *P. pardus* (CITES I) skin and 134 pieces of otter skin. Two people who were arrested claimed that the skins had been purchased in a neighbouring country and were to be smuggled out of China after being processed into luxury items. The case is being investigated by Baoshan Forest Police Bureau.

On 11 March 2002, the Anti-Smuggling Taskforce seized some 9000 live freshwater turtles from the cargo holds of two mainland vessels off Po Toi Island, southeast of Hong Kong, close to mainland waters. Eleven crew members were arrested. The consignment had been issued with a health certificate by Thai authorities and was imported from Bangkok by cargo plane on the same day. However, there was no export document.

The turtles had been taken to the cargo handling area in Wan Chai by an employee of a local company. About 30 police and Customs officers then mounted a surveillance operation during which time the boxes were seen to be loaded on to a fishing boat and later transferred to another boat off Po Toi Island, where police speedboats were sent to intercept them. The consignment was reported to be destined for Huiyang, Guangdong. The turtles are a popular delicacy in many mainland restaurants.

On 18 April 2002, Liu Huasheng was sentenced to life imprisonment and fined RMB500 000 (USD60 000) for smuggling ivory into China. Two others, Shi Zongying and Lu Baolai, were sentenced, respectively, to 10 years and nine years' imprisonment and fined RMB100 000 and RMB50 000.

The sentence relates to the seizure by Customs officials at Dagang, Qingdao, Shangdong, of 295 pieces of ivory (CITES I) tusks, weighing 2613.5 kg. The items had been concealed in a container loaded with teak lumber arriving by sea from Nigeria on 16 May 2001.

Yunnan Daily (China), 29 August 2001; Reuters News Service, 28 November 2001; South China Morning Post (China), 13 March 2002; Jinan Branch, CITES Management Authority of China, in litt., *to CITES Secretariat, 10 September 2001; 29 April 2002*

HONG KONG

On 25 October 2001, Customs officials seized 2.7 t of pangolin *Manis* scales, reportedly estimated to represent 5000-6000 pangolins. The bags had been hidden behind dried sea cucumbers which arrived on a ship from Indonesia.

On 11 December 2001, an illegal shipment of 9300 live turtles was seized at the Yau Ma Tei Public Cargo Working Area during a joint operation involving the Customs Ship Search and Cargo Command and the Agriculture Fisheries and Conservation Department (AFCD). This is the largest-ever seizure of live turtles in Hong Kong. The animals, on route from Singapore via Macau to China, were in four three-metre containers and were intended for the food trade. They were in a poor condition, and had clearly been caught in the wild: many still had hooks in their mouths. They were placed at the Wild Animal Rescue Centre at Kadoorie Farm and Botanic Garden (KFBG) for identification and initial triage. With the help of the IUCN Turtle Survival Alliance (TSA), the turtles have been placed with reputable establishments throughout the USA and at EAZA-registered zoos (members of the European Association of Zoos and Aquaria) for rehabilitation and long-term management.

The species included Black Marsh Turtle *Siebenrockiella crassicollis*; Malaysian Giant Turtle *Orlitia borniensis*; Yellow-headed Temple Turtle *Hieremys annandalii*, River Terrapin *Batagur baska* (CITES I); Giant Asian Pond Turtle *Heosemys grandis*; Malayan Flat-shelled Turtle *Notochelys platynota*; Spiny Turtle *H. spinosa*; Asian Giant Tortoise *Manouria emys* (CITES II); Asian Box Turtle *Cuora amboinensis*; Malayan Snail-eating Turtle *Malayemys subtrijuga*; Painted Batagur *Callagur borneoensis* (CITES II); and, *Cyclemys* spp.

On 17 July 2002, Lu Hui, a citizen of mainland China, was fined HKD40 000 (USD5128) for the illegal importation of rhino horn and ivory following his arrest the previous day at Hong Kong International Airport. Customs officers carrying out a random check discovered one rhino horn (1.2 kg) and 79 pieces of ivory (1.7 kg) in his luggage. All

specimens were wrapped in aluminium foil and placed in boxes. The defendant claimed that the specimens had been purchased in Dubai and were destined for mainland China. The wildlife items were forfeited.

Agriculture, Fisheries & Conservation Department, Hong Kong, in litt. *to TRAFFIC East Asia, 16 August 2002; Press Release, Kadoorie Farm and Botanic Garden, Hong Kong, 12 December 2001; European Association of Zoos and Aquaria (EAZA) News, 38 2002; Turtle and Tortoise Newsletter 5, January 2002; TRAFFIC East Asia*

JAPAN

On 17 July 2001, at Narita International Airport, a Japanese trader was arrested for the illegal trade of 10 Radiated Tortoises *Geochelone radiata* (CITES I). The 8-10 cm-long specimens, purchased in Thailand, were concealed in the suspect's suitcase and had been intended for sale to one individual. The investigation is ongoing.

On 3 October 2001, police in Aichi Prefecture arrested Takahiko Shibata and Yukiyoshi Azuma on suspicion of illegally importing and selling 12 Hyacinth Macaws *Anodorhynchus hyacinthinus* (CITES I). The suspects had persuaded the curator of a private zoo to breed macaws and lend his name to applications to import these and other birds from the Philippines for breeding purposes. In April 2000, Shibata sold two of the Hyacinth Macaws for commercial purposes. Shibata was sentenced to 16 months in gaol, given a four-year suspended sentence and fined JPY800 000 (USD6550). Azuma was sentenced to 10 months' imprisonment and given a four-year suspended sentence.

On 8 November 2001, at Osaka District Court, former pet shop company president Hiroharu Kaito was sentenced to 32 months' imprisonment and fined 2.5 million yen (USD20 558) for illegally importing four Orang-utans *Pongo pygmaeus*, one Siamang *Hylobates syndactylus* and two Hoolock Gibbons *H. hoolock* (all CITES I species) in 1997 and 1998. Four others involved in the case received sentences ranging from 12 to 22 months' imprisonment and fines of between JPY700 000 and 200 million yen (USD5756 and USD16 446).

TRAFFIC East Asia-Japan; Mainichi Shimbun (Japan), 8 November 2001

TAIWAN

On 9 April 2002, Customs officers at Chiang Kai-shek Airport seized animals parts, including skins of one Leopard *Panthera pardus* (CITES I) one Leopard Cat *Prionailurus bengalensis* (CITES I/II), seven Tiger *P. tigris* (CITES I) skin wallets, and one bear leg/paw. The items were detected by X-ray inspection of the luggage of a Taiwan national returning from Ho Chi Minh City, Vietnam.

On 5 May 2002, General Maritime Patrol Agents confiscated 350 juvenile Amur Sturgeons *Acipenser schrencki* (CITES II) (initially mistakenly identified as *Acipenser sinensis*) from a fishing boat in the Taiwan Strait. The fishermen on board claimed that they had smuggled 800 sturgeons across the Taiwan Strait to Taiwan on each of two previous occasions. They claimed not to know the source or intended destination of the fish but stated that they had been received at sea and were to be collected in Taiwan.

TRAFFIC East Asia; China Times (Taiwan) 6 May 2002

SOUTH ASIA

INDIA

In February 2002, in a landmark judgement, the Chief Judicial Magistrate of Katni in Madhya Pradesh convicted Shrimati Tulasia and Shrimati Mantoshi to one year's 'rigorous' imprisonment and fined both women Rs.10 000 (USD205) for possessing four Leopard *Panthera pardus* (CITES I) skins. The court ordered that if they failed to pay the fine within 30 days, they would have to undergo another five months' imprisonment.

The two residents of Katni were arrested with the fresh skins while travelling on the Utkal Express train from Budhar to Delhi.

The case was disposed of in a record ten months from the time of arrest to the delivery of the judgement in the Trial Court.

On 17 March 2002, the Special Branch of the Delhi Police arrested two traders and seized 80 shahtoosh shawls at Jangpura Extension in New Delhi. The two traders, both residents of Srinagar in Jammu and Kashmir, are believed to be among the biggest suppliers of shahtoosh shawls in Delhi and connected with the largest suppliers and exporters of shahtoosh in the world. They stated that they had been involved in the trade since 1978. The shawls are of top quality and are estimated to represent about 240 Tibetan Antelopes *Pantholops hodsgonii* (CITES I). The accused were remanded in custody for 14 days.

On 17 May 2002, the Kerala State Forest Department, with the assistance of the Wildlife Protection Society of India (WPSI), seized a huge cache of ivory carvings in Trivandrum. An ivory trader well-known to the police, his son, and two others, were arrested. Four ivory carvings were seized, including one of almost 1.2 m in length and weighing over 40 kg. The other carvings were 43-45 cm high. The tusks had come from elephants poached in south India.

Wildlife Protection Society of India [www.wpsi-india.org], 20 February/18 March/20 May 2002

SOUTHEAST ASIA

INDONESIA

On 12 July 2002, Customs officials at Soekarno-Hatta International Airport foiled an attempt to export illegally 1526 live turtles, arriving from Banjarmasin, South Kalimantan, bound for Ghuangzou, China. The reptiles - 1423 Asian Box Turtles *Cuora amboinensis* (CITES II) and 113 River Terrapins *Batagur baska* (CITES I) - were destined for the food and medicine trades. The case is under investigation.

Jakarta Post (Indonesia), 17 July 2002, cited in cites-I-digest V1

MALAYSIA

On 8 August 2002, the Wildlife and National Parks Department seized 46 specimens at a roadblock in Tanjung Karang, Selangor. Two men, on their way to a processing centre in Selangor with the animals, were released on bail. The pangolins are believed to have been collected in Perak, Negri Sembilan and Selangor.

New Straits Times (Malaysia), 23 July/9 August 2002

SINGAPORE

On 28 June 2002, at PSU port, the Agri-Food and Veterinary Authority (AVA) seized six tonnes of African Elephant *Loxodonta africana* ivory tusks and over 40 000 ivory pieces (intended for making name seals) which had been shipped in six crates. AVA, which is responsible for the implementation and enforcement of CITES in Singapore, is investigating and working closely with Singapore Customs, police and other international agencies on this case.

The Lusaka Agreement Task Force (LATF), an inter-governmental institution that seeks to reduce illegal trade in wildlife in Africa with the support of international law enforcement agencies, co-operated to effect the interception of the ivory in Singapore. The Task Force had been conducting investigations on the ivory for the last few months, and indicated that the consignment had moved from Zambia, Malawi, and South Africa before the interception in Singapore. One man has been arrested in connection with the incident and is in police custody.

In August 2002, 1000 Star Tortoises *Geochelone elegans* (CITES II) were seized from the luggage of an Indian national arriving at Changi Airport. He was fined SGD5000 (USD2800) and gaoled for eight weeks. The tortoises were sent back to India.

Some 2400 Star Tortoises have been seized at the airport this year.

Agri-Food & Veterinary Authority, Ministry of National Development Press Release, 11 July 2002; International Fund for Animal Welfare [www.ifaw.org], 9 July 2002; cites-I-digest VI

THAILAND

On 8 January 2002, Customs officials in Muang district of Chumphon province seized some 400 pangolins *Manis* from a lorry. The driver of the vehicle and others fled before the authorities arrived. The animals are believed to have been smuggled from Malaysia, on route to China, Hong Kong or Taiwan, for use in traditional Chinese medicines.

In July, police seized 712 pangolins and arrested two Thai men after the lorry in which they were travelling was stopped in the Lang Suan district of Chumphon province. The specimens, concealed in 70 plastic crates, are believed to have been brought from Malaysia and destined for mainland China, Hong Kong or Taiwan to be used as a TCM ingredient. They were to be taken to a Thai Forestry Department wildlife centre.

Nearly 3000 pangolins are reported to have been seized by Thai police this year.

Bangkok Post (Thailand), 10 January 2002

OCEANIA

AUSTRALIA

On 31 May 2002, at Western Australia District Court, Captain Joseph Franco Rivas was charged with four counts of being in charge of a foreign vessel fishing in Australian waters without a licence. He was fined

AUD50 000 (USD27 000). Two officers, Jose Fraga Sanchez and Jesus Jose Quelle Marina, were each fined AUD25 000. The Spaniards were crew aboard the Lena, one of two Russian fishing boats captured by the Australian Navy in February near Heard Island, 2200 nautical miles southwest of Perth, after being found catching Patagonian Toothfish *Dissostichus eleginoides*.

The Russian captain of the other boat, the Volga, died in March, three weeks after drinking cleaning fluid and orange juice cocktails with three Russian crew mates while in detention aboard his boat in Fremantle Harbour, near Perth. It is believed they mistook a bottle of Indonesian cleaning fluid for alcohol. The three other Russians survived and have been charged with using a foreign boat for fishing without a licence. They have been released on bail of AUD75 000 each and a preliminary hearing will take place in November 2002.

Both vessels were confiscated and a total of 200 t of toothfish seized.

Environment News Service, 12 February 2002
Associated Press, 23 April 2002, TRAFFIC Oceania

AMERICAS

CANADA

On 22 October 2001, at Vancouver Provincial Court, Gilles Deslisle of St. Raymond, Quebec, was fined CAD50 000 (USD31 000) for the illegal importation of six Queen Alexandra's Birdwing *Ornithoptera alexandrae* butterflies (CITES I). He was charged with one count of importing wildlife which was taken in contravention of a foreign law under s. 6(1) WAPPRIITA *(Wild Animal and Plant Regulation of International and Inter-provincial Trade Act)* and one count of importing wildlife without a permit under s. 6(2) WAPPRIITA. Mr Deslisle was acquitted of four other counts relating to two other importations. The butterflies were ordered forfeit to the Crown.

The charges stemmed from an incident which took place on 28 September 1998 when a parcel containing a hollowed out hardcover book concealing six Queen Alexandra's Birdwing butterflies was intercepted at the Customs Mail Centre in Vancouver. A lengthy investigation by officers of the Wildlife Enforcement Section, Pacific and Yukon Region, revealed that the originator of the package was a villager from Papua New Guinea. Working with the Papua New Guinea authorities, the Wildlife Enforcement Section arranged for immunity from prosecution for the villager and arranged for his travel to Canada to testify against Deslisle. The evidence showed that Deslisle conspired with the villager to smuggle the butterflies knowing that the activity was contrary to the laws of Papua New Guinea and Canada. A representative of the Government of Papua New Guinea also travelled to Canada to testify as to the laws of Papua New Guinea.

Gilles Deslisle is a renowned researcher in this field and has published several scientific articles on *Ornithoptera* spp.

On 30 October 2001, at Ontario Court of Justice, Welland, Ontario, Johanne Flikkema, of Fenwick, Ontario, was sentenced to one year of imprisonment, "to be served in the community", and fined CAD50 000 and ordered to perform 40 hours of community service work.

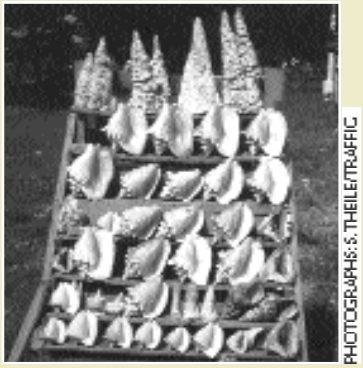
The **Queen Conch** *Strombus gigas* is one of the most economically valuable fisheries resources in the Caribbean. Overfishing to meet the demand of conch meat is considered to be the principal cause of declining *S. gigas* populations. The use of scuba equipment has allowed expansion of the fishery into previously unexploited areas thereby placing many deep water populations at risk.

Jamaica, where a number of cases involving the illegal harvesting of Queen Conch have recently been prosecuted, is one of the largest producers and exporters of Queen Conch meat in the region. Up to 95% is harvested from the offshore Pedro Banks, an area where probably more than 50% of all Queen Conch meat in international trade originates.

Although still a small-scale artisanal fishery in the mid-1980s, by the end of the decade significant landings of Queen Conch were being recorded. Following indications that the fishery was in danger of collapsing, a Management Plan was drawn up that included the establishment of a quota system, one which has been refined and revised several times over the past decade. The fishery was closed in 1999 due to a revision of the relevant legislation and a dispute about the allocation of quotas; it reopened in May 2001 but closed again after a short period. At the time of writing the fishery has not reopened.

TRAFFIC is undertaking a 'significant trade review' of the Queen Conch following the decision of the CITES Animals Committee in August 2001 to reintroduce the species into the process. This will be reviewed and discussed at the 19th Animals Committee meeting to be held early in 2003.

TRAFFIC Bulletin 16(1):17-28; Queen Conch Fisheries and their Management in the Caribbean, TRAFFIC Europe, December 2001.



Top: Queen Conch *Strombus gigas* shells; Middle: Packing Queen Conch meat in Jamaica; Above: Queen Conch shells on display.

Flikkema's husband, Mike Flikkema, and their son, Harold, were convicted and fined a total of CAD75 000 on similar charges in 2000 (*TRAFFIC Bulletin* 18(3):128). Mike Flikkema was also sentenced to three months in gaol.

The Flikkemas operated Flikkema Aviaries in Fenwick, Ontario, a major supplier of exotic birds. The investigation by Environment Canada's Canadian Wildlife Service and the US Fish and Wildlife Service revealed that from 1 December 1997 to 6 October 1999, Flikkema Aviaries illegally exported 3882 tropical finches and illegally imported approximately 756 tropical finches, 30 parakeets and 20 Hill Mynas *Gracula religiosa* (CITES II).

Both Johanne Flikkema and Mike Flikkema have several previous convictions involving the illegal import and export of live birds. On 1 June 2000, Johanne Flikkema was gaoled in the USA for six months for smuggling approximately 1000 tropical finches into the USA and for making false statements.

Environment Canada

USA

On 13 August 2002, the US Coast Guard seized a Honolulu-based fishing vessel about 350 miles southeast of Acapulco, Mexico. The vessel was found to be carrying 12 tonnes of shark fins in violation of the *US Shark Finning Prohibition Act*.

The case is under investigation.

http://www.uscg.mil/pacarea/pcp/newsreleases

CARIBBEAN

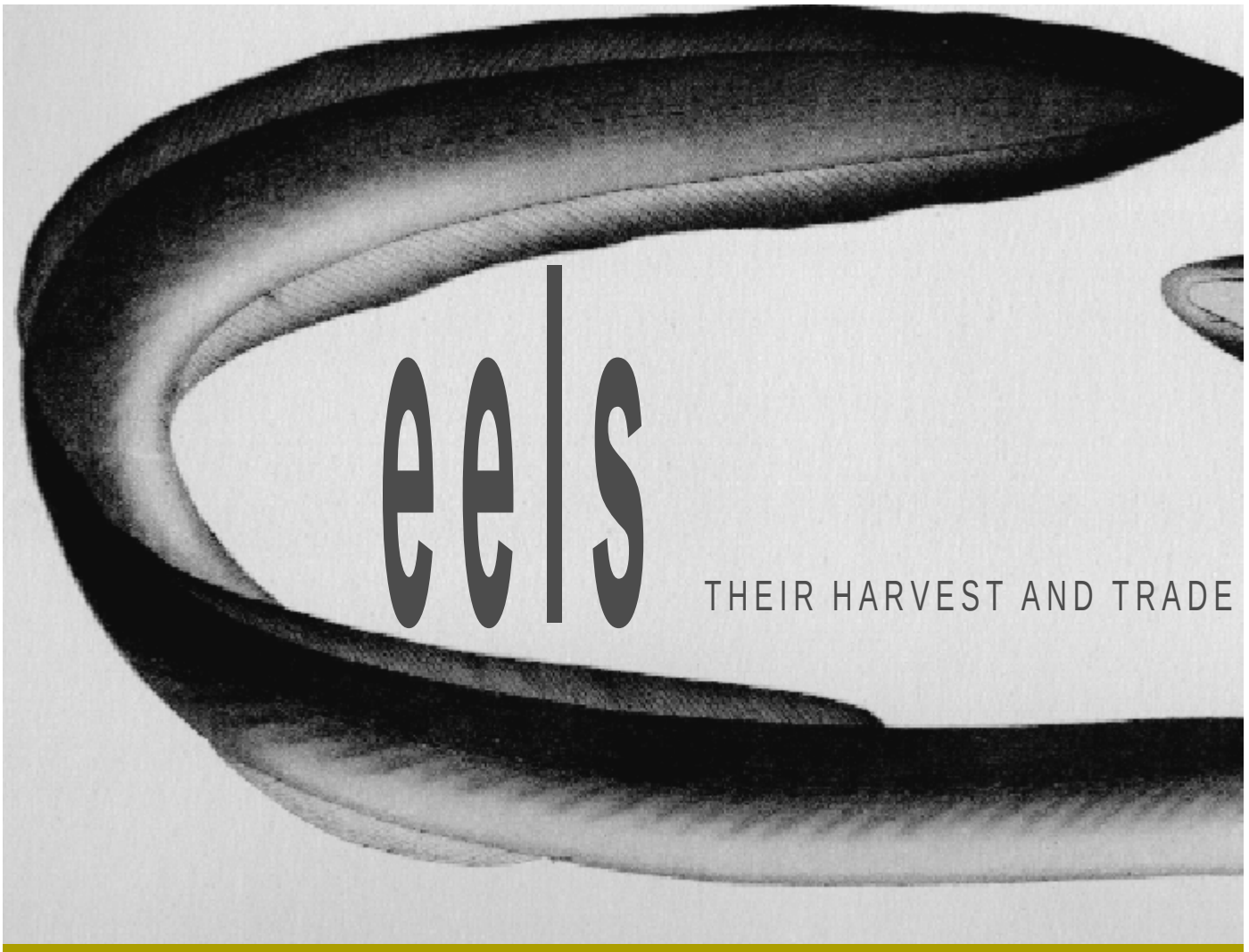
JAMAICA

On 24 January 2002, Clifford Meja and Ashley Hinds, of Honduras, were charged under the *Wildlife Protection Act*, the *Aquaculture Act* and the *Fishing Industry Act* with unlawfully handling, harvesting and processing Queen Conch *Strombus gigas* (CITES II), taken from the Pedro Banks in Jamaican waters without a licence. The pair, captain and chief mate, respectively, of the vessel Thunder Ridge, pleaded guilty to the charges and were each fined JD1 million (USD22 000) or sentenced to 12 months' imprisonment - the highest fines ever imposed in Jamaica for an environmental offence. In addition, Meja was fined JD80 000 and Hinds was fined JD60 000 or six months' imprisonment for possession of a Hawksbill Turtle *Eretmochelys imbricata* (CITES I). They were also fined JD1000 or nine months' imprisonment for fishing without a licence and JD500 or six months' imprisonment for fishing for conch during a closed season.

On 26 April 2002, 104 Honduran fishermen were charged with poaching in Jamaica's territorial waters following their arrest by marine police after more than 450 kg of Queen Conch (and 3 kg of lobster) was seized from their vessel.

The captain of the vessel, Jose Nagera, was fined JMD1 million (USD22 000) for operating a factory vessel for the purposes of processing for export; the chief mate is in remand awaiting charges. The fishermen were each fined JMD1000 or sentenced to 30 days in gaol for fishing without a licence; fined JMD500 or 30 days in gaol for possession of undersized lobsters, and fined JMD200 or 30 days in gaol for operating an unlicensed boat. The vessel, equipment and catch were seized.

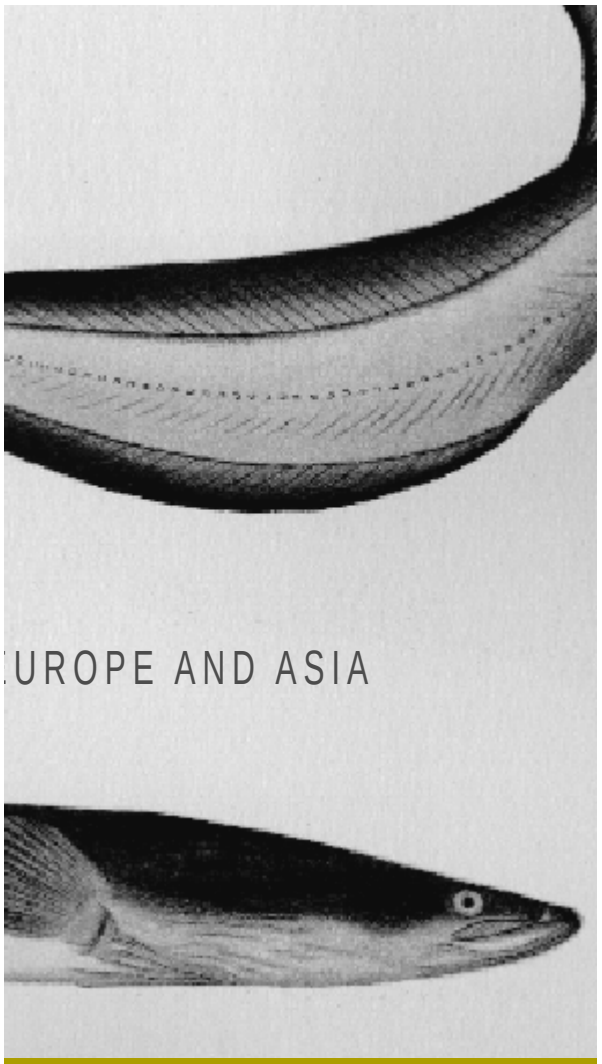
Environment News Service, 24 January 2002; TRAFFIC International; http://www.jamaicaobserver.com/news



eels

THEIR HARVEST AND TRADE

ILLUSTRATION: TEMMINCK & SCHLEGEL (1846)



EUROPE AND ASIA

STÉPHANE RINGUET

FUMIHITO MUTO

and CAROLINE RAYMAKERS

EEL POPULATIONS OF SOME SPECIES IN THE GENUS *ANGUILLA* HAVE DECLINED DRAMATICALLY OVER THE LAST TWENTY YEARS. THIS LOSS HAS BEEN ATTRIBUTED TO CHANGES IN OCEAN CURRENTS AFFECTING MIGRATION, THE LOSS OF RIVER HABITAT, POLLUTION, THE IMPACT OF INVASIVE SPECIES AND LOCAL FISHING. INTERNATIONAL TRADE MAY ALSO HAVE PLAYED A ROLE IN THE SPECIES' DECLINE. TOWARDS THE END OF THE 1990S, THERE WAS A SERIOUS FALL IN THE NUMBER OF JAPANESE EELS AVAILABLE TO SATISFY THE DEMAND IN THE JAPANESE FOOD MARKET. TO BOLSTER THE DWINDLING LOCAL SUPPLY, EUROPEAN EELS WERE IMPORTED TO ASIA IN LARGE NUMBERS TO SUPPLY FARMING OPERATIONS, LEADING, IN TURN, TO OVERFISHING AND POACHING IN EUROPE, AND A SURGE IN EEL PRICES. BY 2001, CATCH FIGURES FOR EELS WERE THE LOWEST ON RECORD. THIS REDUCTION IN EEL NUMBERS IS ESPECIALLY WORRYING SINCE THESE FISH ARE AN ESSENTIAL FOOD FOR MANY PREDATORS; MOREOVER, THE TRADE IN EELS PROVIDES A SOURCE OF INCOME FOR A CONSIDERABLE NUMBER OF PEOPLE IN ASIA AND EUROPE. EELS ARE PARTICULARLY VULNERABLE OWING TO THEIR LONG AND COMPLEX BIOLOGICAL CYCLE, ABOUT WHICH MUCH IS STILL UNKNOWN.

INTRODUCTION

The European Eel *Anguilla anguilla*, Japanese Eel *Anguilla japonica*, and American Eel *Anguilla rostrata* are the principal *Anguilla* species considered to be of the greatest commercial importance for food. Among the many popular eel dishes consumed around the world, *kabayaki* - marinated grilled eel - is a national dish in Japan during July and August, while smoked eel is favoured in Europe and North America, and eel larvae are eaten as appetizers in Spain.

About 95% of eels in the food trade have been raised in captivity, but most of this production is based on catching and rearing wild-caught juvenile "glass eels". Since the mid-1990s production has increased rapidly (Figure 1), while populations of all three species have suffered serious declines (Moriarty and Dekker, 1997; Tzeng, 1999; Tatsukawa, 2001). Although European Eel populations have always been low, recruitment has declined considerably since the late 1970s (Moriarty and Dekker, 1997). The causes of the decline in all three species are not well understood, and have been attributed to different factors affecting recruitment, growth and/or the eel's reproductive stages (FAO, 1993; Tatsukawa and Matsumiya, 1999; Kim, 2000). The need for radical management action is clearly urgent (Matsumiya, 1999; Kim, 2000; Dekker, 2000b) and has been communicated several times (FAO, 1993; Moriarty and Dekker, 1997). In an effort to improve understanding of these biologically mysterious animals and to aid eel conservation, the Government of Japan is funding research of a joint programme between scientists and industry into finding effective measures to increase eel populations (Japan Fisheries Resource Conservation Association, 2001).

The international trade in eels was identified in the current four-year programme of TRAFFIC Europe as an important area of study in response to reports of the relatively recent and rapid decline in populations of the three main species in trade. The study aimed to explore the reasons for this fall in numbers and to evaluate the degree of threat posed by the trade. Because the global dimensions of the trade in eels are little understood, TRAFFIC examined the status of the trade in Europe and Asia - the primary markets - the control measures in place and the current management goals of producing countries.

METHODS

Information presented in this paper is based on work carried out by TRAFFIC staff in Europe and East Asia over a period of one year during 2001-2002, and forms part of a broader ongoing TRAFFIC study on the eel trade. Research consisted of examination and analysis of data collated by European Customs authorities (EUROSTAT), FAO (FISHSTAT), Japan Marine Products Importers Association (JMPIA), Sea Products French Office (OFIMER), Japan's Ministries of Finance (MOF) and of Agriculture, Forestry and Fisheries

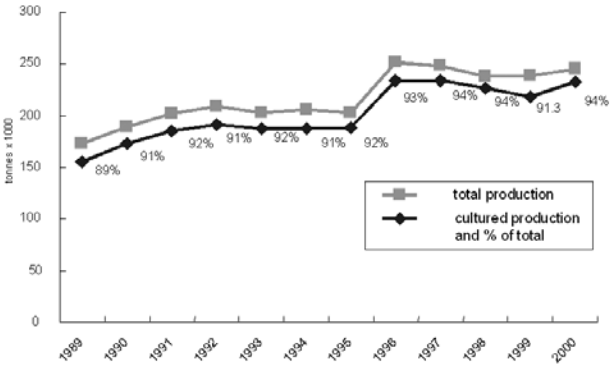


Figure 1. World production of eels (t). *Sources: Anon., 2001a,b*

(MAFF). Interviews were conducted with key scientists and stakeholders, fishermen, fish trading companies, governmental fisheries departments, and associations involved in the culture of eels. Information relating to management and monitoring surveys was extracted from the literature.

Some members of the International Council for the Exploration of the Sea/European Inland Fisheries Advisory Commission (ICES/EIFAC) Working Group on Eels (WGEEL), responsible for collation of data relating to the European Eel and other species, were consulted. This body is a coalition of two former working groups on eels - namely the ICES/ACFM (Advisory Committee on Fisheries Management) Working Group on Eels and the FAO/EIFAC Working Party on Eels (WPEEL). The EU Concerted Action (a collation of existing data designed to formulate a management plan for eels in the European Union, drawn up during 1994 to 1997) presented a general overview of the management of the European Eel through the contribution of scientists from ten European countries (see Moriarty and Dekker, 1997). Several reports on the European Eel (ICES, 1994; 1996; 2000; 2002), which include recommendations concerning management issues, were also examined.

The present article focuses on European and Japanese Eels. Glass eels of both species are referred to herein as European glass eels and Japanese glass eels, respectively.

Customs data: Customs codes for all goods in trade in Europe follow the Harmonized Commodity Description and Coding System (HS), in effect since 1988. The system is made up of figures representing the Customs value, the origin and the tariff description. It comprises an eight-figure sequence, the first six numbers being the same in each country party to the system, with the remaining two numbers used by each country for their own purposes. All *Anguilla* species are recorded under the same tariffs, with separate codes for different products: for example, live eels, chilled eels, frozen eels or smoked eels are, respectively, recorded under the following numbers: 0301.92.00, 0302.66.00, 0303.76.00 and 0305.49.50. European statistics thus only provide information about the international trade of the *Anguilla* genus, rather than the individual species.

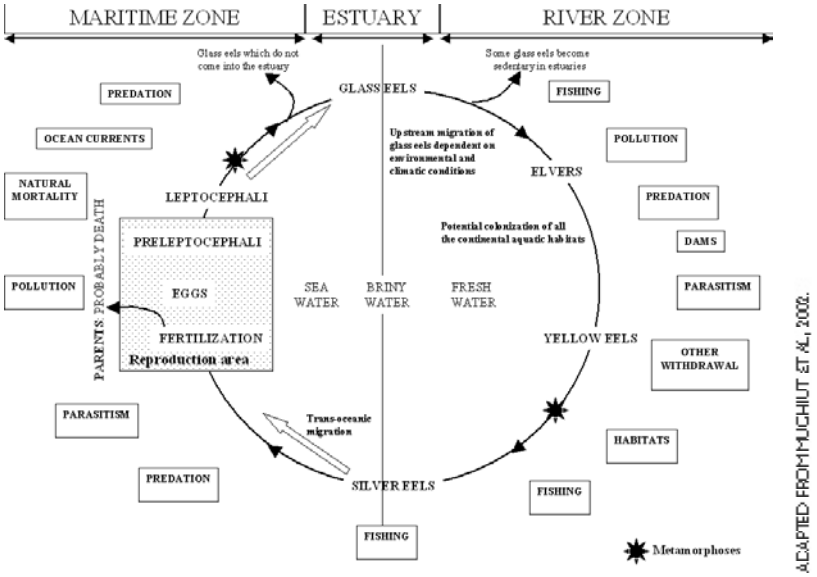


Figure 2.
The biological cycle of the eel and the principal threats it faces. Little is known about the eel's migration routes and mystery still surrounds the different stages of its life cycle.

The HS system has also been adopted in Japan, mainland China and Taiwan where it is applied more rigorously than in the EU. These countries have a basic code of four digits and include up to a further seven digits to identify eel items in more detail. Japan's system is composed of nine digits and covers live eels, eel fry for culture, fresh or chilled eels, frozen eels, prepared or preserved eels, whole or in pieces. All refer to *Anguilla* spp. (Anon., 2002e). Mainland China uses a system comprising 11 digits which has been in effect since February 2002. Sometimes products are mixed with conger eels, and there is no specific code for glass eels (Anon., 2002b). Taiwan has also introduced an 11-digit code system. The code for young eels used for culture is divided into three stages but there are no specific codes for Japanese, European and American Eels (Anon., 2002c).

SPECIES DESCRIPTION

Eels are teleost fish (fish with bony skeletons) belonging to the superorder Elopomorpha and the family Anguillidae (Nelson, 1994). According to the most recent taxonomic revision, the genus *Anguilla* includes 15 species and three subspecies (Watanabe, 2000) which can be found in all temperate and tropical waters except the southern part of the Atlantic and east coast of the Pacific (Williamson and Tabeta, 1991; Avice, 2001). Eels are amphihaline species (aquatic species which pass periodically at well defined stages of their life cycle, from salt to freshwater and vice versa) (Figure 2), with a carnivorous diet which changes during each stage of their life cycle. In most continental waters, eels account for a significant proportion of animal biomass in

Figure 3.
Rough sketch of the spawning area (*black dot*), distribution (*grey area*), and larval migration (*arrows*) of the American Eel *Anguilla rostrata* (1); European Eel *A. anguilla* (2); and, Japanese Eel *A. japonica* (3).

the sea and form an important component of fish communities and essential food items for many predators such as otters and herons. They are an important link in the food chain and, as migratory fishes, are essential to organic matter fluxes between marine and continental waters.

The European Eel is generally considered a panmictic species ((i.e. eels of one species constitute one population). However, recently available genetic evidence against panmixia in the European Eel has been underlined (Wirth and Bernatchez, 2001). These results from genetic studies suggest that three putative, genetically distinct sub-groups may exist, respectively, in northern, western and southern regions of Europe.

Biology

Little is known about the life cycle or migration routes of the eel. It is known that the European Eel (and the American Eel) spawns in the Sargasso Sea in the western Atlantic Ocean, and the Japanese Eel, off the Mariana Islands in the western Pacific Ocean, and that the newly hatched larvae (*leptocephali*) are carried inland on currents (Figure 3) (Tsukamoto, 1992). By the time young eels reach the continental shelf and river estuaries, they have developed into transparent, cylindrical fish, known as glass eels, which are approximately five centimetres long and weigh less than one gramme. They continue their migration, usually to freshwater habitats, and their skins turn a darker colour; at this stage of their life cycle they are referred to as elvers in Europe and the USA, or *kuroko* (blacky) in Japan. Once the eels have reached about 10 cm long they enter their immature adult or 'yellow eel' phase, which can last between five and nine years, depending on the species, sex and geographic location of the growing habitat. The male European Eel reaches maturity at between three and nine years and the female between five and 18 years, and can spend 20 years in inland waters (Keith and Allardi, 2001), while the Japanese Eel spends 12 to 15 years in fresh water/estuaries before returning to the sea to spawn (Tsukamoto *et al*., 1998). The adult eel takes on a silvery appearance with the onset of sexual maturity (and is referred to as a silver eel) (Tesch, 1977). It ranges in size from 30 cm to one metre in length and weighs 300 g to three kilogrammes, the females always bigger and longer than the males. The European Eel can take 1.5 years (Antunes and Tesch, 1997) and as long as three years (Dufour, 1996) to return to the sea; the duration of the Japanese Eel's migration to the sea is unknown. All anguillid eels die after spawning (Haro, *et al.,* 2000) (Figure 3).

What occurs between the silver eel and glass eel stages is also largely unknown. The spawning grounds have only been detected from the appearance of planktonic eel larvae (Schmidt, 1922; Tsukamoto, 1992). Tanaka *et al*. (1999) and Mochioka (2001) suggest that eel larvae in the wild feed on plankton or organic detritus.

The range of the European Eel extends across all accessible continental or coastal hydrosystems which are linked with the Baltic and North Seas, as well as the English Channel, Atlantic and Mediterranean coasts between Iceland and Mauritania (23° to 70° N). The Japanese Eel ranges from Vietnam, the Philippines, Taiwan, mainland China, the Korean Peninsula, and the Japanese Archipelago, excluding some northern areas.

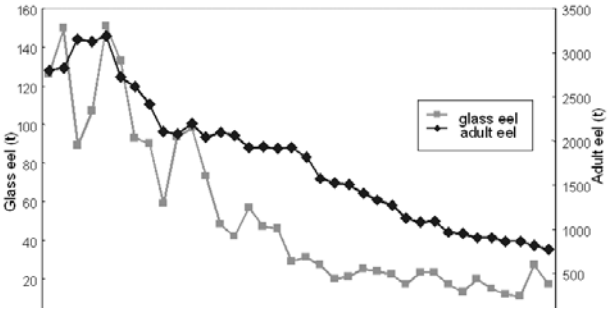


Figure 4. Total catch of eels in Japan (t). *Source: Anon., 1969-2000*

Status of Wild Populations and Fisheries

Description of eel fisheries

Eels, from the glass eel to the silver eel stage, are exploited by commercial fishers and anglers. In East Asia, only Japan traditionally consumes eels as food (although eel has started to be served in restaurants in South Korea). The annual catch of Japanese glass eels in Japan fluctuates, but the trend is one of overall decline (Figure 4) (Anon., 1969-2000). All glass eels caught in Japan are used in eel culture, and the silver eel and yellow eel fisheries there are quite minor.

The European Eel is the only eel species targeted in Europe, with an estimated annual catch (of eels at all stages of their life cycle) of approximately 30 000 t (Moriarty and Dekker, 1997), compared to figures in Asia for Japanese Eels of 1300 t (and in the USA for American Eels of 1000 t) (Anon., 2001c). The impact of this exploitation on eel populations is unknown, although the yield of yellow and silver European Eels has declined. The total number of eel fishermen in Europe is estimated at approximately 25 000 (Moriarty and Dekker, 1997). The fisheries occur in inland countries, the Northeast Atlantic and Mediterranean regions (Anon., 2001c). Eels are targeted at the stage they have reached in their life cycle when they pass through coastal waters, estuaries and rivers: glass eels are caught in southwest Europe and northwest Africa, yellow eels throughout the distribution area. Compared with the southern part of Europe, few glass eels reach the coast in northern Europe and traditional fisheries there (particularly in the Baltic and Northern Ireland) focus on adult (mainly silver) eels on their way to the sea to spawn (Dekker, 2002a). Recruitment is estimated at about 2000 million eels annually (Dekker, 2000b), most of which enter coastal waters, estuaries and rivers via the Bay of Biscay.

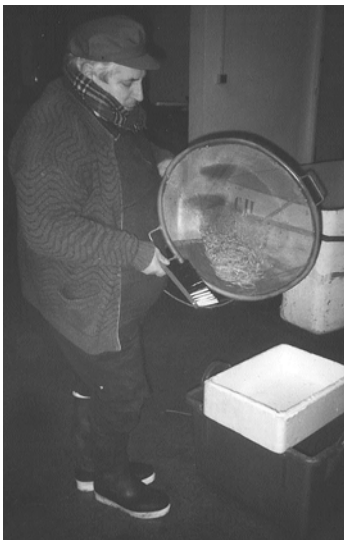
S. RINGUET/TRAFFIC

Eel fishing boat near the Arzal dam, Brittany, France. Owing to ocean currents, most eels arriving in Europe enter coastal waters, estuaries and rivers via the Bay of Biscay.

The main European glass eel fisheries are concentrated along the Atlantic coasts of Portugal, Spain, France, Morocco and the Bristol Channel in the UK. Elsewhere, eel fisheries are maintained by restocking within the country, often supplemented by imports, mainly from France, Spain and Portugal (Dekker, 2000a). In this context, restocking refers to the practice of maintaining a stock by regular release of juveniles that are introduced from other areas. The fisheries are generally small-scale operations and must be largely considered artisanal (Moriarty and Dekker, 1997). All stages of the fishery are seasonal and most participants supplement their income from other sources. The main season for catching glass eels in France and Japan is between November and April. Closed seasons are in operation in some countries and are usually based on the traditional fishing seasons in place in those countries (e.g. Ireland), or are related to regulations established to allow unhindered migration of salmonids (e.g. Denmark and Northern Ireland).

In France, glass eels represented about 75% of the estuarine fisheries turnover (USD30 million) for the season 1997/1998 (Perraudeau, 2000), and were the most common fish caught in the Bay of Biscay in 1997. In that year, the total production of amphihaline species fisheries was 1750 t (valued at USD81.77 million) and was composed of 410.5 t of European glass eels (valued at USD72.65 million), and 302 t (USD3.2 million) of European Eels at other biological stages (Castelnaud, 2000). In 1999, more than 300 t of glass eels were caught by professional fishermen in Europe, of which 245 t were caught by professional fishermen in France. This represents a turnover in France of EUR33.6 million. Moreover, about 75 t of glass eels are caught in France by non-professional fishermen (Castelnaud, 2002).

A professional fisherman with glass eel catch on a tributary of the River Loire, France (left); the size of the catch can fluctuate hugely, and is influenced by many factors, including environmental conditions, the phases of the moon, temperature, and tides. It took three hours to catch the amount illustrated here. Glass eels (right).



S. RINGUET/TRAFFIC

T. NIELSEN

The decline in eel landings in Asia and Europe

According to Anon. (2001c), landings of European Eels, Japanese Eels and American Eels dropped to 43.5%, 64% and 8.3%, respectively, over a period of 17 years (1984 to 2000) (Table 1). A few data series which take into account some fishing pressure indices, like the Catch Per Unit Effort (CPUE)[1], show the same trends. On the Loire (France), for example, a fisher caught 45 kg of eels per fishing trip (a total of four hours per trip) during the 1975-1978 period and only three to four kilogrammes of eels per fishing trip in 1997 (P. Elie, pers. comm., 2001).

Fishing methods

A variety of fishing gears has evolved for capturing eels. In France, for example, 19 types of gears and nets are permitted to be used by professional fishermen and characteristics between these are often adapted to meet their specific needs; amateurs are allowed to use 11 types of gears and nets (with special restrictions on shape and size).

Glass eels

Glass eels are exploited commercially in England, France, Spain, Portugal, Italy and Morocco. The fisheries take place in estuaries and at the mouths of rivers and dams where the natural concentration of glass eels can more easily be exploited. Hand-held or ship-based nets are used, which are moved manually or are fixed, and include trawls, stow nets, and fyke nets (a trap consisting of a net suspended over a series of hoops laid horizontally in the water).

In Spain and Portugal, fishermen use hand-held nets and traps. In France, glass eels are caught by small trawlers using wing nets and trawls. In the UK, the hand net is the only legal instrument for fishing eels. Glass eels are caught in the River Severn and are reported to be of the highest quality in Europe. The method of

	1965	1974	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Anguilla japonica[1]	-	2164	2125	2132	2013	1940	1607	1475	1280	1192	1203	1066	1042	1023	1014	916	904	830	765
A. anguilla[2]	18174	15878	13716	12384	13412	12834	14532	12438	12774	12157	13220	11721	12180	9873	9996	11402	8835	7786	7742
A. rostrata[1]	-	1412	1211	1414	1377	1288	1735	1790	1713	1872	1682	1649	1748	1284	1316	1270	1244	1125	1107
Total	**18174**	**19454**	**17052**	**15930**	**16802**	**16062**	**17874**	**15703**	**15767**	**15221**	**16105**	**14436**	**14970**	**12180**	**12326**	**13588**	**10983**	**9741**	**9614**

Table 1. Landing statistics for eels since 1965 (in tonnes). [1]*Anon., 2001c; [2]reported by FAO database, with minor corrections (ICES, 2002).*

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
A. japonica																
Japan total[1]	151	133	93	90	59	93.58	98	73	48	42	57	47	46	29	31	27
Chongming Island, Mouth of Yangtze, Mainland China[2]	-	-	-	-	-	0.508	0.246	0.132	0.095	0.276	0.369	0.982	0.636	1.282	0.773	0.644
Korea total[3]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
A. anguilla																
Europe[4]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
England and Wales[5]	-	-	-	18	28	58	10	12	38	62	68	40	37	48	16	25
France (Loire)[6,7]	225	453	330	311	292	563	495	770	654	523	608	502	284	266	276	168
Spain and Portugal (Minho River)[6]	-	-	-	-	-	1.6	10.5	20.0	36.6	24.3	28.4	21.3	54.2	16.4	30.4	31.4
Denmark (Ems)[6]	1.68	0.68	1.68	3.89	0.29	4.13	1.03	4.20	2.17	2.02	2.77	3.19	0.96	0.67	0.09	0.35
Italy (Tiber)[6]	-	-	-	-	-	-	11.0	6.70	5.90	3.60	8.40	8.20	4.00	4.00	4.00	1.80
Belgium (Ijzer)[6]	-	-	-	-	-	0.94	0.26	0.62	0.45	0.39	0.67	0.36	0.07	0.14	0.01	0.00

Table 2. Annual catches of Japanese and European glass eels (t). - = no data available

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
A. japonica																
Japan total[1]	20	21	25	24	22	17	23	23	17	13	20	15	12	11	27	-
Chongming Island, Mouth of Yangtze, Mainland China[2]	0.303	0.411	0.627	0.177	0.289	1.17	0.005	0.003	1.1	-	-	-	-	-	-	-
Korea total[3]	-	-	-	-	-	-	-	7.141	5.135	5.94	7.09	8.693	8.573	3.398	7	-
A. anguilla																
Europe[4]	-	-	-	-	-	-	-	-	-	500	350	370	145	280	199	-
England and Wales[5]	20	19	21	21	20	20	1	5	6	10	12	19	9	12	-	-
France (Loire)[6,7]	159	137	93	138	61	76	30	32	80	95	68	32	90	80	95	-
Spain and Portugal (Minho River)[6]	20.7	12.5	8.2	8.0	9.0	6.0	9.0	10.0	7.6	4.7	15.2	8.7	7.4	7.4	-	-
Denmark (Ems)[6]	0.26	0.09	0.008	0.07	0.01	0.1	0.05	0.00	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.00
Italy (Tiber)[6]	2.50	0.20	7.40	10.50	5.50	4.40	0.80	0.60	0.50	0.50	0.30	0.10	0.10	0.13	0.06	0.07
Belgium (Ijzer)[6]	0.01	0.03	0.03	0.05	0.03	0.22	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.02

Table 2 continued. Annual catches of Japanese and European glass eels (t). - = no data available; [2]Shi (1993); [3]Lee *et al.* (1999); [4]Nielsen (1998, 2000); [5]in ICES, 2002; [6]Dekker, 2002b; [7]ICES, 2002 for the years 1998 and 1999

A glass eel fishery based at the mouth of a lock on a tributary of the River Loire, France. Fisheries take place in estuaries and at the mouths of rivers and dams where the concentration of glass eels can more easily be exploited.

fishing has a significant impact on the quality of the fish. Trawling compresses glass eels with small fish and detritus which may damage the eel's skin and compromise its osmoregulation and defence mechanisms (Anon., 2002g). Some fishermen use boat engines in excess of the maximum horsepower permitted and if the speed of the fishing boat is too high while fishing, the eels swallow water. Both methods of fishing may cause the eels to swell and turn cloudy after a few days, and death follows quickly. It should be emphasized that the fishermen are paid by the weight of the product caught, rather than the quality.

Elvers, yellow and silver eels

In Europe, elvers moving upstream are sometimes captured, either for direct use as food, or for safe and quick transportation to waters otherwise only reached after a long and hazardous journey.

Yellow eels of a reasonable size, though less valuable than silver ones, are nevertheless readily marketable. The fishery for yellow eels involves the use of cheap and fairly simple gear - baited traps, fyke nets, baited long lines, spears or shore seines. Of these, the first three methods are the most commercially viable; choice may, however, be governed by what is permitted locally. Generally speaking, small eel traps and trap nets do not interfere with other species such as salmon, and, from a conservation perspective, it is often considered desirable to keep down the number of eels which would otherwise prey on other species of fish.

The best time to catch silver eels in Europe is when they are migrating to the sea; by that stage, they have reached their maximum size, their fat content is high and they are in peak condition. The capture of migrating silver eels often requires fairly large, robust and expensive pieces of equipment and, for example in many fast-flowing rivers, is sometimes not possible at all.

The decline of glass eel catches

Asia: Japan used to catch large numbers of Japanese glass eels, but this figure has been declining since the 1970s (Table 2; Figure 4). Data showing the CPUE are available in a few cases. Isono (1999) drew attention to the declining recruitment when he used these data in Tanegashima Island in 1991 and recorded a CPUE (catch/person/hour) of 46, a value that gradually decreased year after year; in 1997 it had fallen to 14. Tzeng (1997) used CPUE (No./day) for the seasons 1991/92-1994/95 which showed a negative correlation with water temperatures. CPUE of adult eels are not available. Kato (1999) considered that MAFF catch data (e.g. Anon., 1969-2000) for Japanese eels are an accurate reflection of abundance.

Europe: In estuaries in France, the total European glass eel catch has decreased from about 1345 t in 1970 to 520 t in 1989 (Castelnaud *et al*., 1994). According to Nielsen (1998, 2000) the catch has been more or less in decline since 1994 (Table 2).

Analysis of the available recruitment data series (12 countries and 19 river catchments) from both catch records and scientific surveys across much of the geographic range of the European Eel show that, following the high catch levels of the 1970s, supply began to fall (ICES, 2000). During the 1980s, the downward trend continued, stabilizing in the 1990s (Table 2). Recent years, however, show a continued decline; 2001 catch figures are the lowest on record for all series where data have been reported (ICES, 2002).

[1]*Catch Per Unit Effort: the amount of catch that is taken per unit of fishing gear, e.g. the number of fish per longline hook/months is one way to express CPUE. CPUE can be used as a measure of the economic efficiency of a type of gear, but normally it is used as an index of abundance, i.e. a proportional change in CPUE is taken to represent the same proportional change in abundance. Nominal CPUE is simply the measure of CPUE from the fishery. However, it is known that there are many factors (including economics, geographical distributions) which may affect CPUE but do not represent changes in abundance. Therefore, CPUEs are often "standardized" using a variety of statistical techniques to remove the effect of those factors which are known not to be related to abundance. Thus, using the standardized CPUE will be more appropriate for an index of abundance.* Source: http://www.fao.org

THREATS

Habitat damage

The fall in eel populations is often attributed to the decline in quality and accessibility of their continental habitat: the loss of wetlands in Europe is thought to have reduced the available eel habitat by at least 50%. Currently the habitat area in Europe is estimated at over 87 000 km^2 (Moriarty and Dekker, 1997).

Tatsukawa (2001) concluded that the construction of river dams was one of the major reasons for the decline of eels in Japan. Loss of freshwater habitat to the construction of dams has occurred in a number of countries (Anon., 2001e), which has modified habitat quality and, unless supplied with eel passes, reduced access to upstream habitats. Moreover, obstruction to downstream migration and mortality caused by turbines (direct mortality as much as 100% in some sites) considerably reduce the ability of the silver eel to reach its spawning grounds. Deteriorating water quality in water systems all over Europe may also have contributed to eel mortality (Knights, 1997; Robinet and Feunteun, 2001). Isono (1999) suggested water pollution as a major reason for the decline in Japan.

Eel fisheries - legal and illegal

The losses of eels incurred between the silver eel and spawning stages are not possible to assess. In Europe, the number of silver eels that succeed in reaching their spawning grounds is estimated to be very low (ICES, 2002). There is no information on the impact of glass eel fisheries on recruitment. In France, very high levels of fishing mortality have been recorded, ranging from 20-25%, in open estuaries such as the River Adour (De Casamayor, cited in ICES, 2002), to 98% in closed estuaries such as the River Vilaine (Briand *et al*., in press).

The greatest proportion of the annual recruitment globally is for aquaculture, mainly in Asia; 20% is consumed as glass eels, 20% is trapped and transported to restocking areas and 15% freely migrate to inland waters (Dekker, 2002a).

Eel poaching mainly concerns glass eels and is particularly active in southern Europe. It is dependent on the migration of glass eels, which is affected by environmental conditions, the phases of the moon, temperature, and tides, all of which could be determining factors on catch variability. Furthermore, glass eels sometimes travel along the bottom of rivers and are then almost impossible to catch; if the range of the thermic variation exceeds 3-4 degrees, glass eel migration is inhibited. While poaching may not be constant throughout the season, it can be extensive. In Portugal, for example, net bags of 10-20 m in length are widely used illegally in all national rivers where glass eel fishing is prohibited (with the exception of Rio Minho) (C. Antunes, pers. comm., 2002). At the local level, poaching has led to numerous confrontations between poachers and professional fishermen. In the west of France (Loire-Atlantique, Gironde), poachers form bands of a dozen to about forty people, and are often armed.

A few years ago, it was estimated that during the open fishing season, tens of kilogrammes of the glass eels marketed had been landed by non-professionals: of the 520 t landed by 4360 fishermen in 1989, 73% were taken by non-professionals (Castelnaud *et al.*, 1994). The turnover realized was estimated at more than USD34 million (Rigaud, 1998). In France, in 1997, the Brigade Mobile d'Intervention (BMI) of Garonne-Dordogne arrested two wholesale fishmongers who had no written proof of the origin of 62% and 80%, respectively, of their glass eel stock (Taillebois, 1998). According to a professional fisherman (pers, comm., 2001), glass eels poached in France and Belgium in 1998 to 1999 were exported to China via Madrid.

The demand for eels intensified in response to sharp price rises in 1997. Given the life cycle of the eel, glass eels catches have repercussions 10 to 15 years later on the number of potential spawners returning to the sea (Fontaine, 2001). Matsumiya *et al*. (1999) examined catch data for Japanese glass eels and found a significant negative correlation in the amount of Japanese eels cultured per year (t) with the amount of adults caught eight years later.

In Japan and other East Asian countries, non-glass eel fisheries are insignificant and are not considered a reason for the decline in eel numbers.

Invasive species of eels and parasites

The transfer of eels for trade and restocking purposes presents a risk of the spread of disease and the introduction of parasites. In Europe, in the 1980s, a parasite *Anguillicola crassus* invaded wild eel populations after being unintentionally introduced from East Asia (Ashworth and Blanc, 1997). Endemic to the Japanese Eel, the parasite causes severe damage to the swim bladder of the European Eel and its haematophagous diet (subsisting on blood) is thought to interfere with the oceanic migration of breeders (Bruslé, 1994).

The European Eel, in all its stages of development, has been observed in Japan and its presence is considered to be a problem (Tabeta *et al.*, 1977, 1979; Zhang *et al*., 1999; Aoyama *et al.*, 2000; Aoyama and Tsukamoto, 2001; Sawada and Yanagisawa, 2001, Han *et al.*, in press). Its presence there has been attributed to stock enhancement carried out before the early 1990s, release of sick or slow-growing eels, or eels that have escaped from culture ponds. Fisheries laws in Japan may contribute to the problem of invasive species by insisting on enhancement of freshwater stocks without specifying with which species. Of particular concern has been the presence of silver eels of European and American Eels along the coasts and estuaries of Japan and Taiwan (Aoyama *et al*., 2000; Han *et al.*, in press). These introduced species move into the vicinity of the spawning grounds of the Japanese Eel, which could result in interspecific hybridizations and the collapse of the species.

Climatic changes in the ocean

Knights *et al*. (1996) suggest that a northwards shift in the north wall of the Gulf Stream could have caused some *leptocephali* of European Eels to follow longer, more northerly routes. This could have exposed them to less favourable temperatures and affected food availability. Tzeng (1997) found a negative correlation between CPUE of Japanese glass eels and water temperatures in a river. Kimura *et al*. (1999) pointed out a decline in catches of Japanese glass eels in years when El Niño occurs, when, according to computer simulation, many Japanese glass eels swim in unfavourable ocean currents.

E. FELNTEIJN

European Eel *Anguilla anguilla*: a licence to fish commercially is required throughout Europe.

Conservation Status

In 1980, the European Committee for the Conservation of Nature and Natural Resources of the Council of Europe classified the eel as "vulnerable" (Lelek, 1980). Matsuda (1999) considers the Japanese Eel to be "Critically Endangered" according to IUCN Red List criteria, and ICES (1999) considers the European Eel "outside safe biological limits" in the context of the *Agreement for the implementation of the provisions of the United Nations Convention of the Law of the Sea of 10 December 1982 relating to the conservation and management of straddling fish stocks and highly migratory fish stocks* (Anon., 2001d).

Conservation Measures

National fisheries and conservation regulations

Asia: In Japan, catching eels is usually prohibited although special permission may be granted by a prefecture. Although this regulation is generally respected, the fishery does exist but its extent is unknown. Some of those interviewed were unwilling to co-operate for fear of reprisals. In Miyazaki Prefecture, a legal fishery for glass eels takes place in some of the major rivers and is conducted by a parastatal organization only; one of the reasons for this is to eliminate the influence of the black market (the other reason is to ensure a stable supply of glass eels to eel farmers in the prefecture) (Sato, Hieshima, Saito and Takamura, pers. comm., September 2001).

Other eel fisheries in Japan for direct human consumption are small and are licensed. Stock enhancement of freshwater regions is required by law and glass, yellow and silver eels are released for this purpose.

Europe: There are strong regional differences in the measures taken to regulate eel fisheries, although a licence to fish commercially is required throughout Europe, with some countries or regions requiring submission of catch returns (Moriarty and Dekker, 1997).

Broadly speaking, there are five principal conservation measures in place for glass eel and elver fisheries:

- a ban on commercial fishing in Denmark, Germany, Netherlands, Northern Ireland, Republic of Ireland and Sweden;
- a requirement for elver passes in Denmark, France, Republic of Ireland, Great Britain, Netherlands and Sweden;
- gear type regulations in France, Great Britain, Portugal and Spain;
- closed seasons in France, Portugal and Spain;
- licences for fishing/dealing in France, Great Britain, Italy, Portugal and Spain.

Seven conservation measures have been drawn up for yellow and silver eel fisheries in Europe:

- gear controls in all countries;
- controls on net mesh sizes in Denmark, Italy, Netherlands, Republic of Ireland and Great Britain;
- closed fishing seasons in Denmark, France, Netherlands, Northern Ireland, Portugal, Republic of Ireland, Spain and Sweden;
- licences for fishing/dealing in France, Germany, Italy, Netherlands, Northern Ireland, Republic of Ireland and Great Britain;
- limits on the size of eels caught in Spain, Denmark, Italy, Netherlands, Northern Ireland, Republic of Ireland and Sweden;
- free gaps in weirs in Denmark; Northern Ireland, Republic of Ireland and Sweden;
- quotas in Northern Ireland.

In addition, Portugal banned eel fishing during the 2001-2002 season except on the Rio Minho (C. Antunes, pers. comm., May 2002).

International legislation

Eels do not receive protection under international law.

F. MUTO/TRAFFIC

Eel farming pond, Pingdong, Taiwan. Eels in Taiwan can grow in winter without the need for water heating, as is necessary in Japan. The quality of Taiwanese products are prized by professional eel cooks in Japan but in recent years increasing overhead costs have forced many farms to shift to the farming of softshell turtles or shrimps.

Inside an eel farm, Isshiki, Aichi Prefecture, Japan. The eel pond (left) contains algae to shield nervous eels from human activity. The shelter (centre) contains the feed, and the underwater nets containing bait are kept in the dry pond-area (right).

F. MUTO/TRAFFIC

EEL FARMING

Fish culture is carried out in numerous ways. The raising of fish from eggs, larvae or juveniles can be divided into four stages (Table 3). The one most easy to control and for which there is a long tradition is that which involves the raising of juvenile fish to maturity in a closed, artificial environment. Ranching uses wild-caught larvae or eggs from wild specimens that have been raised in captivity but which have difficulty breeding in artificial conditions. The 'extension' method involves raising sexually immature fish, usually of recently introduced, high-value species. Finally, adult fish are fattened up - a process known as *Chikuyô* in Japan - until they have attained market size and quality.

Raising eel larvae to the glass eel stage has never been a success and eel farming can only succeed by using wild-caught juveniles, mostly glass eels. The principal eel species used in aquaculture are the European Eel, Japanese Eel and American Eel. Eel farmers need about three to four kilogrammes of European glass eels and two and a half kilogrammes of Japanese glass eels to produce about one tonne of commercial eels (Nielsen, 2000). Han (1999) estimated that 8000 European glass eels and 3900 Japanese glass eels were needed to produce one tonne of cultured eels of each species.

More than 90% of the world production of eels are cultured in Asia (Table 4), in particular Japan, Taiwan and mainland China. Many eel farms in mainland China use European glass eels as their culture material. Recent developments in aquaculture techniques has allowed for a reduction in glass eel mortality of both the European and Japanese Eels. The American Eel has been introduced in Taiwan (Liao, 1999), where aquaculture production for this species is below 50 t.

History

Asia: Eel aquaculture began in Asia in 1879 in Tokyo with the raising of elvers. It was not until 1931 that a culture trial using glass eels succeeded at the commercial level. Taiwan and mainland China provided Japan with glass eels and, after the end of World War II, eel farming grew into a stable industry until 1997 (Figure 5). A major reason for this loss of stability was the chronic shortage of glass eels (Otsuka, 1996). Eel farmers tried to import glass eels of 12 species/subspecies from European countries, the USA, Canada, Morocco, Cuba and others (Tabeta *et al*., 1979; Tabeta, 1991). However, the method used in Japan to culture Japanese Eels is very specialized and efforts to apply such techniques to the farming of other species have been unsuccessful at the commercial level. Imports of exotic eel species to Japan are now rather low (Table 5).

Taiwan started farming eels in 1923 and has been exporting eel products to Japan since 1969 (Liao *et al.*, 1999). Eel farming was introduced in mainland China in the 1970s (Han, 1999) where it grew into an industry in the 1980s (Kuroda, 1999); by 1992, European glass eels were being used for breeding stock. The survival rate of farmed eels in mainland China increased from less than 20% in 1993 to up to 70% in 2000 (Anon., 2002d). With the relatively abundant supplies of European glass eels and cheap prices compared to those for Japanese species, 70% of farms in mainland China began to breed European Eels at the end of the 1990s (Anon., 2002d). Important eel farms in mainland China are located primarily in Guangdong province.

	Materials	Examples
Complete culture	Cultured seeds	Common Carp, trout, salmon
Ranching	Wild larvae, wild juvenile	Japanese Eel, European Eel, Yellow Tail
Extension	Wild, immature fish	Australian Eel, Southern Bluefin Tuna
Fattening	Adult	Atlantic Bluefin Tuna

Table 3. Division of fish cultures.

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Anguilla spp.[1]																	
China (mainland)	-	-	-	-	-	60000	67672	80582	91655	100000	110000	120000	147316	167208	163098	164484	160740
Taiwan	36621	36845	35975	42489	51577	48008	55816	55641	51023	39959	33364	25546	25063	22337	17241	16543	30480
Japan	38030	39568	36520	36994	39558	39704	38855	39013	36299	33860	29431	29131	28595	24171	21971	23211	24118
Others	3436	4066	5394	8091	7310	7557	10157	10072	11962	13239	14756	13169	33033	19802	23801	14457	17477
Total	**78087**	**80479**	**77889**	**87574**	**98445**	**155269**	**172500**	**185308**	**190939**	**187058**	**187551**	**187846**	**234007**	**233518**	**226111**	**218695**	**232815**
A. anguilla																	
Europe[2]	1950	2229	3448	4729	5517	5159	6667	6098	6349	6818	7721	7689	8935	9031	10646	11059	10839

Table 4. World culture production of eels and European Eel production in Europe (tonnes).
- = no data available
[1]*Source: Anon., 2001b*
[2]culture production in European Union countries (Italy, Netherlands, Denmark, Sweden, Germany, UK, Belgium/Luxembourg, Spain, Portugal and Greece) and non-EU countries (Norway, Morocco, Algeria, Tunisia, Macedonia, Yugoslavia, Croatia, Hungary and Czech Republic) according to FAO, FEAP data and others. *Source: ICES, 2002.*

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Main species
ASIA														
South Korea	400	1761	600	-	-	1174	2800	351	4357	1145	579	650	370	*A. japonica*
North Korea	208		43	12	21	-	-	2	21	-	-	-	-	"
China	944	3627	1094	-	-	32	1253	885	5304	1709	499	1510	-	"
Taiwan	1648	1150	676	123	-	-	3914	116	247	2935	107	1164	69	"
Hong Kong	6439	8181	2388	113	11	21	295	1434	5837	7407	4991	5995	-	Undetermined
Philippines	-	-	-	-	-	8	236	210	93	121	-	-	-	*A. japonica*
Indonesia	-	-	-	-	-	247	-	-	-	-	-	-	-	*A. japonica*
Total Asia	**9639**	**14719**	**4801**	**248**	**32**	**1482**	**8498**	**2998**	**15859**	**13317**	**6176**	**9319**	**439**	
EUROPE														
Sweden	-	-	-	-	258	1070	600	-	-	-	-	-	-	*A. anguilla*
Denmark	-	-	-	157	-	-	472	968	-	-	-	-	-	"
Ireland	-	-	-	-	-	-	-	74	-	-	-	-	-	"
UK	-	-	-	-	-	42	-	-	150	78	156	-	100	"
France	1792	1928	220	907	450	3088	1435	1284	1060	336	-	-	-	"
Total Europe	**1792**	**1928**	**220**	**1064**	**708**	**4200**	**2507**	**2326**	**1210**	**414**	**156**	**0**	**100**	
OTHERS														
Canada	-	-	-	-	-	-	-	-	-	30	-	-	-	*A. rostrata*
USA	-	-	-	-	-	5	945	64	357	-	126	100	-	"
Australia	-	-	-	-	-	-	-	30	-	-	-	-	-	*A. australis*
Total Others	**0**	**0**	**0**	**0**	**0**	**5**	**945**	**94**	**357**	**30**	**126**	**100**	**0**	
TOTAL	**11431**	**16647**	**5021**	**1155**	**897**	**5687**	**11478**	**4922**	**18394**	**13761**	**6458**	**9419**	**539**	

Table 5. Import of glass eels and young eels for culture in Japan by country of export (kg).
- = no data available *Source: Anon., 2002a.* Main species are detected by biological distributions.

F. MUTO/TRAFFIC

Grading eels by size, Hamamatsu, Shizuoka Prefecture, Japan. Medium-sized specimens, used for *kabayaki*, fetch the highest price. After selection the eels are placed in baskets (left) and kept alive for a few days under water sprinklers to remove their "muddy" taste.

The yield has grown to two thirds of the world production (FIS, 2000a). The reasons for this success are thought to be down to the quality of aquatic worm species used as food (Fontenelle, 1997), and the cold, clean water of mountainous areas, which is more suited to the European than to the Japanese Eel (Han, 1999; Kuroda, 1999). In 1997, 90% survived from the glass eel stage to reach a weight of 10-12 g and gained a further three to four grammes within three to five weeks. The youngest specimens reached commercial size (200 g or larger) within 10 months (Fontenelle, 1997).

Farmed eels in mainland China are sent to more than 60 processing factories in the country (compared to eight in 1980), and are mainly exported to Japan after being processed (Luneau, 1998a; Anon., 2002f). Japan is the third eel producer in the world just behind Taiwan (Table 4), but its annual production decreased from 39 013 t in 1991 to 24 118 t in 2000 (Anon., 2001b).

Volume and value of eel farming in Asia

All Asian farming production depends on European and Japanese glass eel stocks. These vary from between 100 t and 300 t of glass eels of both species (FIS, 2000b). Asian glass eel stocks are mainly composed of European glass eels (up to 81% in 1997 and 63% in 2000) and amount to an average of 130 t/year since 1996, with a maximum of 240 t in 1997, which correspond to about 960 million glass eels. According to an industry newspaper for fish culture in Japan (Anon., 2002f), a total of about 30-160 t of glass eels are stocked each year in artificial ponds in East Asia. China supplies two thirds of the world production of eels - 130 000 t each year since 1998 (FIS, 2000b), worth over USD1.3 billion. Eel farming can be quite lucrative. For example, on one hectare of farmland, the net income from eel breeding can reach 1.2 to 1.35 million yuan (USD145 000 to USD163 000) in the cities of Nankai and Shunde in the delta of the Pearl River (Guangwei and Shishan, 1999). In Taiwan, the eel is the most important farmed fish, with an annual production which fluctuates at between 26 000 t and 56 000 t, and worth more than USD400 million (Anon., 2002h).

Europe: Aquaculture of the European Eel started in the early 1970s. In 1970, European production was estimated at 3400 t, while the culture of the Japanese Eel in Asia amounted to 17 000 t (ICES, 2002). Farming techniques can be divided into three main categories (Varadi *et al.*, 2001):

1) Extensive farming, the oldest technique, exploits the natural tendency of the fish to enter brackish lagoons to grow. After about five to seven years, the mature fish leaves the lagoon to migrate to its spawning grounds and is captured by fixed devices. This technique is mainly used in Italy.

2) Intensive farming using concrete or earth ponds for growing on, requires warmer waters, and is more commonly used in Italy, Spain and Greece.

3) Water recirculation systems also use intensive farming criteria and have been the basis for recent developments in the Netherlands, Denmark and Sweden. Eels are held within small concrete or fibreglass tanks (+/-25 m^2) and water is heated for maintaining optimal temperatures.

Aquaculture plants range from the highly industrialized, indoor facilities in northern Europe, to artificial ponds in southern Europe, while aquaculture facilities are also used for the quarantine of exotic species of glass eels that are used to restock semi-natural outdoor waters for fisheries in northern Europe (e.g. Sweden).

Volume and value of eel farming in Europe

According to FAO, FEAP (the Federation of European Aquaculture Producers) and other sources of data (ICES, 2002), eel farming production quadrupled from 1950 t in 1984 to 10 839 t in 2000 (Table 4) and, since 1998, has been stable (at about 10 500 t/year).

In 2000, the Netherlands, Denmark and Italy provided 87% of the total European Eel production, and held 80% of the 178 eel farms in Europe, which realized 80% of the turnover (USD84.9 million in 1996) (Nielsen, 1998; 2000).

Landings reported by FAO have declined from 20 000 t in 1970 to less than 10 000 t in 2000 (see above). During the same period, however, European aquaculture production rose from almost nil in 1970 to 10 839 t in 2000, which accounts for the total European production remaining level.

In 1996, the turnover of intensive farming reached about USD65 million, of which 80% is realized in Italy, the Netherlands and Denmark (Luneau, 1998b).

INTERNATIONAL TRADE IN EELS

Trends of international trade in live eels

The volume of live eel exports (all species and all biological stages) reached 25 794 t in 1997 (compared to about 5000 t before 1983) and was valued at USD385 million (e.g. an average price of USD15/kg) (Anon., 2000b). The relative stability of world exports during the last decade can be attributed to the involvement of Europe, Africa and Oceania in the world export markets which had hitherto been dominated by Asia, as well as to the numerous eel species now involved in the trade (Table 5).

From 1987 to 1997, the total volume of Asian exports decreased from 90% to 58% of world exports. Moreover, turnovers of European and Asian exports were respectively about USD204 million (e.g. USD22.3/kg) and USD168 million (e.g. USD11.2/kg) in 1997.

Trade in glass eels

A number of factors strongly suggest that Japanese Eel populations started to decline after the 1970s (e.g. see Tatsukawa, 2001). Certainly, from 1997, the catch of Japanese glass eels plummeted for a few years, and eel farmers using Japanese glass eels were badly affected by this shortfall. European glass eel users exploited this opportunity, in particular the Chinese eel farming industry, which increased its imports and the raising of European glass eels. The size of the farming industry is now so large that only limited amounts of Japanese glass eels are used.

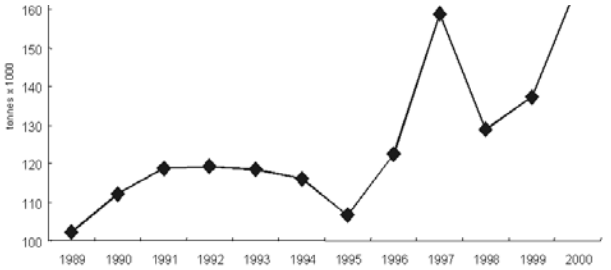


Figure 5. Japan's consumption of eels (green weight, t) (excluding glass eels). *Sources: 2001a,b*

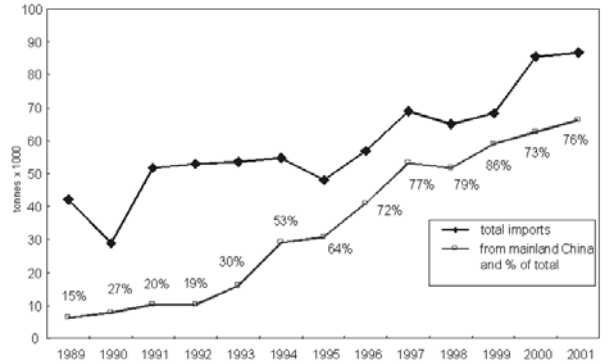


Figure 6. Japan's eel imports (green weight, t) (excluding glass eels). *Source: 2002a*

According to one source, prior to 1994, less than 20 t of European glass eels were exported to Asia each year, increasing to about 50 t during the 1994/95 season and as much as 230 t during the 1996/97 season. Exports decreased sharply from the 1996-1997 season to the next, to 90 t, later stabilizing at about 100-130 t, levels at which exports are currently estimated (Nielsen, 1998; 2000). However, sources from the Danish eel farming sector estimate that exports in total in 1996-1997 were 250 t, but dropped to 140 t the following season. Sources of OFIMER seem to confirm the latter trend (Anon., 1998).

Since 1993/94, European glass eels have been mainly exported to China and Hong Kong, and, to a lesser extent, to farms in Japan, Taiwan and Singapore, and then sold and consumed mainly in Japan (Fontenelle, 1997).

According to Anon., 1999b, France is the main EU country to export eels outside the EU (Table 9). It is apparent from comparison of the data available that these are wild-caught glass eels which are mainly exported to Asia. Exports from France were less than 10 t before 1994, and increased rapidly to 266 t in 1997 (Table 9). Since 1997 exports to Asia have decreased, falling to 78 t in 2000 (60 t and 18 t to Hong Kong and China, respectively) (Anon., 2000a). This can be attributed in part to price changes and more effective culture methods in China. In 2000, France exported 60 t and 10 t of European glass eels to Hong Kong and China, respectively.

Glass eel commerce in France is mostly managed by Basque traders. After cleaning, the dead eels are separated from the live specimens and sent to the Spanish market (Fontenelle, 1997; Nielsen, pers. comm., 2002); the remainder go to mainland China (Shanghai) and Hong Kong via European airports (Paris, Amsterdam or London). In 1997, about three cargoes of glass eels a day were sent by plane to China (Nielsen, pers. comm., 2002). One kilogramme of live glass eels are packed in the equivalent weight in ice into polystyrene boxes. On arrival, they are dispensed by a small number of distributors to a large number of farmers although sometimes glass eel wholesalers may negotiate directly with buyers in China (Fontenelle, 1997; Nielsen, pers. comm., 2002).

The distribution route of glass eels in Japan is unclear and Japan Eel Culture Associations have often proposed imposing stricter rules for such transactions (Anon., 2002f).

Taiwan banned the export of glass eels from 1973 to 2001, and exported elvers during this period. Formerly, the industry involved in raising elvers was large, but it no longer has any economic significance in Taiwan.

Glass eel price evolution

The growing demand for European glass eels in Asia led to a three-fold increase in prices between 1993 and 1997, with mean export prices rising from USD119/kg to USD312/kg. After a brief slump in price to USD188/kg in 1999, it increased to USD281/kg in 2000 (Nielsen, 1998; 2000; pers. comm., February 2002). Table 6 shows huge monthly fluctuations during 1993 to 2000, particularly during the 1996-1997 and 1997-1998 seasons, reflecting the fluctuating availability and demand.

The decline and rarity of Japanese glass eels led to an increase in their price: about USD11 800/kg in 1996 (USD2.4 each) compared to USD425/kg for European glass eels (USD0.17 each) (Luneau, 1998a). European glass eels imported by Japan from France, Denmark and the UK were on average 10 times cheaper than Japanese glass eels imported from other countries (for example, mainland China, Hong Kong, and Taiwan) in 1997 (USD280/kg vs. USD2934/kg) (Anon., 1975-1998).

The huge price differences between the two species may be explained by (i) the size of European glass eels, which are half as big as Japanese glass eels (Table 7) and (ii) the mortality rate of European glass eels, which is four times greater. As a consequence, breeders have to import eight times as many European glass eels as Japanese glass eels to maintain production. Another explanation of the difference in prices is that, prior to 1997, European eels had been difficult to culture at the commercial level to satisfy the quantity and quality needed for the Japanese market, and were sometimes used in the production of "fake" glass eels (Inaba, 1997b) (see box, page 96). One reason for the difficulty in using the European species is the size required for the final products, an important factor affecting the price of eels in Japan. Eels used in *kabayaki* need to be about 150g, with eels of a greater or smaller size being less valuable. For this reason, Japanese eel farmers try to produce eels of the same size and at the same time, generally six months after putting glass eels into an artificial pond. Differences in the shape and taste of the two species were also reasons for the difficulty in using the European Eel in eel culture for Japan's consumption.

The Chinese monopoly of the Asian market

In recent years, a large part of mainland China's eel production (European and Japanese Eels) has been for export, which, in 1990 and 1994, amounted to 10 000 t and 45 000 t, respectively. Since this period, these figures have increased on average by 10 000 t a year. In 1999, 95 000 t were exported with a value of USD0.67 billion, which represents 80% of the world trade in value (FIS, 2000b).

The traditional Japanese dish of *kabayaki* is actually prepared in mainland China, whose virtual monopoly of production has enabled it to increase the price of this product to Japan, while cheaper manpower than is available in Japan keeps overall prices competitive. Eels are also exported to the EU at lower prices than those of EU producers. For instance, the production of one kilogramme of eel costs USD6.7 in mainland China compared to USD8.2 in France (Anon., 1999a).

Processed eels

According to FAO (Anon., 2000b), more than 36 000 t of eels of all species were exported in 1997. These data correspond to Customs records. These took the form of live (fresh or chilled), smoked and frozen products which represented, respectively, about 6%, 1% and 16% of the international trade in eels during 1988-1997 (Table 10).

Trade in smoked eel is common in the EU. Formerly most trade to Asia was in live eels to provide material for *kabayaki.* However, following a growing trade in *kabayaki* and *shirayaki*, there has been an increase in trade throughout Asia of dead eel products for Japan's consumption. Most factories in mainland China cannot sustain the level of production for Japan without using European Eels. Smoked eel is not usually consumed in Asia.

Values	93/94	94/95	95/96	96/97	97/98	98/99	99/00	00/01
Mean	119	123	200	312	252	207	188	281
Maximum[1]	161(10)	208(11)	230(5)	509(1)	569(3)	400(12)	239(5)	410(12)
Minimum[1]	89(1)	85(02)	160(12)	189(5)	129(12)	121(3)	109(11)	194(3)
Maximum deviation	72	123	70	320	440	279	130	216
Standard deviation	35.4	37.0	20.7	80.9	124.8	87.8	41.3	51.7

Table 6. Prices of European glass eels (USD/kg) for different fishing seasons in Europe.
[1]the number of the month is indicated in parentheses.
Source: Nielsen pers. comm., February 2002.

	No./kg	Note
Adult eels, Japan market	6[1]	Standard size in Japanese
Adult eels, EU	4[1]	Material to export
Glass eels (*A. japonica*)	5000[2]	
	6000[3]	
Seedlings (*A. japonica*)		
from Taiwan	100[4]	
from Korea	750[4]	
Glass eels (*A. anguilla)*		
from France and UK	2000[5]	
from Italy	3000[5]	
from France	2500-3200[6]	December to February
	3100-3500[6]	March and later
from UK	2800-3200[6]	
Glass eels (*A. anguilla)*		
from Europe (not specified)	3000[4]	

Table 7. Rate of conversion from weight to individual numbers.
Sources: [1]Otsuka, 1996; [2]Inaba, 1997a; [3]Tabeta et al., *1979; [4]Tabeta* et al., *1977; [5]Inaba, 1997b; [6]Han, 1999*

	1988		1989		1990		1991		1992		1993		1994		1995		1996		1997		1998	
	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg
AFRICA																						
Namibia	-	-	-	-	0.1	70.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ivory Coast	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	61.0	-	-
Uganda	-	-	-	-	-	-	-	-	0.2	12.0	0.4	34.8	0.9	28.3	-	-	-	-	-	-	-	-
Réunion	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	12.0	-	-	-	-	-	-
The Canaries	0.3	44.3	-	-	-	-	-	-	-	-	-	-	0.1	12.1	-	-	0.4	9.3	-	-	-	-
Ceuta and Mell	-	-	-	-	-	-	2.1	78.1	1.3	243.4	0.8	24.7	-	-	-	-	-	-	-	-	-	-
Morocco	-	-	-	-	-	-	3.4	112.1	7.6	84.4	-	-	-	-	-	-	-	-	-	-	-	-
Tunisia	-	-	-	-	-	-	5.6	3.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Egypt	0.5	60.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0.8	55.0	0.0	0.0	0.1	70.0	11.1	50.8	9.1	105.5	1.2	29.4	1.0	24.7	0.1	12.0	0.4	9.3	0.8	61.0	0.0	0.0
AMERICAS																						
Mexico	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	71.5	-	-	-	-
Honduras	-	-	-	-	-	-	0.4	21.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USA	-	-	-	-	-	-	0.4	37.6	-	-	0.2	145.7	0.3	0.0	-	-	-	-	0.2	65.8	1.1	5.6
Canada	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	45.3	-	-	1.2	8.3
Brazil	0.1	49.7	0.1	108.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antilles	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	0.1	49.7	0.1	108.2	0.0	0.0	0.8	29.7	0.0	0.0	0.2	145.7	0.3	0.0	0.0	0.0	0.6	67.1	0.2	65.8	2.3	7.0
ASIA																						
China	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.4	98.5	23.0	141.8	104.1	109.5	40.8	203.7
South Korea	-	-	-	-	-	-	-	-	-	-	0.1	118.8	-	-	0.8	98.6	-	-	-	-	1.2	130.1
Japan	5.7	39.1	1.8	121.7	1.1	128.2	0.2	142.0	0.3	104.7	1.0	31.2	12.0	61.1	10.7	23.1	4.2	-	5.5	70.9	1.1	88.3
Taiwan	-	-	-	-	-	-	0.6	6.5	-	-	0.2	70.9	0.2	180.8	14.7	27.9	39.6	-	14.2	90.8	14.5	28.1
Hong Kong	-	-	-	-	-	-	0.8	107.2	5.2	87.6	24.1	114.1	7.5	119.4	139.4	80.2	183.6	-	341.0	144.8	95.1	234.6
Israel	0.1	55.4	-	-	-	-	10.0	20.8	1.1	23.4	0.4	23.2	-	-	-	-	-	-	0.3	276.8	-	-
Indonesia	-	-	-	-	-	-	-	-	2.4	44.3	3.1	33.9	1.8	129.9	2.6	78.3	-	-	1.7	229.8	-	-
Malaysia	-	-	1.0	8.6	0.3	8.7	-	-	-	-	-	-	-	-	2.1	37.9						
Singapore	-	-	0.9	10.0	1.6	8.9	-	-	-	-	0.1	141.0	2.6	134.2	-	-	1.5	175.2	-	-	-	-
Philippines	-	-	0.1	8.6	-	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	5.8	39.1	3.8	42.5	3.0	52.6	11.6	28.1	9.0	68.8	31.0	102.1	93.1	112.7	180.6	72.7	251.9	15.8	470.8	134.5	152.7	204.2
OCEANIA																						
Australia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	0.5	433.1	0.5	404.2
Antarctic Ocean	-	-	-	-	-	-	-	-	-	-	0.7	61.6	-	-	-			-	-	-	-	
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	61.6	0.0	0.0	0.0	0.0	0.3	0.0	0.5	433.1	0.5	404.2
EUROPE (excluding EU)																						
Czechoslovakia	0.4	33.9	-	-	0.4	63.1	0.6	4.5	4.0	39.9	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	-	-	-	-	-	-	-	-	-	-	0.4	107.8	0.7	88.4	0.6	124.3	1.9	39.8	-	-	-	-
Slovakia	-	-	-	-	-	-	-	-	-	-	-	-	5.8	27.2	3.5	34.8	1.4	35.5	0.3	421.4	-	-
Hungary	1.9	88.5	0.1	9.5	5.5	42.8	14.6	7.6	1.1	109.9	-	-	0.2	90.8	11.0	4.4	0.1	296.2	-	-	-	-
Gibraltar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0	4.4	-	-
Malta	-	-	-	-	-	-	-	-	0.1	41.9	-	-	-	-	-	-	-	-	-	-	-	-
Yugoslavia	-	-	1.0	9.9	1.0	9.7	0.9	28.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Former Rep. Yugoslavia		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	34.7	-	-	1.0	18.8
Switzerland	0.6	11.0	2.1	7.8	1.0	8.7	0.9	7.6	0.7	9.7	0.6	7.7	1.0	7.5	-	-	-	-	0.1	13.6	0.1	21.1
Turkey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USSR	1.8	53.5	-	-	-	-	2.1	14.2	0.7	128.6	-	-	-	-	-	-	-	-	-	-	-	-
Poland	1.6	85.8	8.6	31.8	5.6	20.1	0.9	102.9	2.2	111.5	3.7	55.8	3.2	80.3	4.1	89.1	3.7	53.1	8.9	29.6	3.1	40.1
Bulgaria	-	-	-	-	-	-	2.7	11.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Russia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	0.3	34.8	1.6	43.6	1.1	77.9	1.1	96.0	1.2	88.3	-	-	-	-	-	-	-	-	0.2	48.8	0.2	43.7
Estonia	-	-	-	-	-	-	-	-	-	-	-	-	0.6	144.2	-	-	0.5	288.5	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	-	-	0.2	95.5	-	-	1.0	47.9	-	-	-	-	-	-
Lithuania	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	104.1	0.4	199.7	0.1	195.3		
Total	6.6	66.4	13.4	27.7	14.6	32.7	25.8	14.2	10.0	73.3	4.9	55.8	11.5	51.2	20.4	33.3	9.0	68.0	12.6	34.4	4.4	33.0
TOTAL	13.3	62.0	17.3	35.8	17.7	36.3	49.3	27.0	28.1	82.3	38.0	93.4	105.9	104.9	201.1	68.6	262.2	17.7	484.9	132.1	159.9	199.3

Table 8. Exports (tonnes) and prices (¹ECU/kg) of eels (including glass eels) from the EU to non-EU Member States. (¹ECU=USD1.099 in 1998). - = 0 *Source: Anon., 1999b*

Eels are highly esteemed for food, especially in Europe and Japan, and some examples of how they are served are described below.

Smoked eel is eaten in Europe, particularly in Scandinavia, Germany, Netherlands, and in North America; Spaniards favour eel larvae/glass eels (*angulas*) as a traditional appetizer or *tapas*, particularly over Christmas, New Year's Day and on 7 January (*Mahaut, pers. comm., 2002*), and in parts of Italy, a dish of eel (*Capitone*) is also traditionally served on Christmas Eve. In UK coastal towns and London's East End, jellied eels (eels cut into chunks and served in a savoury jelly), sprinkled with vinegar, are sold from street stalls. Eel specialities in France include *Anguilles au vert* (eels cooked with spinach and sorrel leaves in white wine) and *Matelotte d'anguille* (eels braised in a red wine sauce). In Belgium, stewed eels in chervil sauce - *Paling in 't groen* - is eaten, and the central region of Portugal specializes in eel stew. Fake glass eels made of white meat fish paste (*surimi*), shaped to resemble glass eels, are taking over large parts of the glass eel market as they are much cheaper, are readily available in shops and are very close in taste and consistency to the real thing. *Surimi* are mainly available in Spain.

In Japan, eels (*unagi*) are prized not only for their flavour but for what the Japanese believe are their stamina-giving properties. They are eaten particularly during the hottest days of summer, during July and August, in the belief that they will provide strength and vitality for the rest of the year. Only adult eels are used and the most popular dish is *kabayaki* - eels grilled, steamed and smoked a number of times after being basted with a sweet soy-based sauce. *Shirayaki* - similar to *kabayaki* but without the sauce - is also popular. In South Korea, barbeque restaurants serve sliced eel, which customers roast on burners placed at each table.

Sources: www.gastronomica.org; TRAFFIC International

Potential action in the context of the World Trade Organization (WTO)

Eel imports to Japan from mainland China have grown rapidly in recent years (Figure 6), a factor that many of Japan's eel farmers consider to be a serious obstacle to their industry.

Multilateral Agreements set out under the General Agreement on Tariffs and Trade (GATT) of the World Trade Organization (WTO) have established a system for member States to safeguard industries that may be damaged by a rapid increase in imports (WTO, 1995). In 2001, this safeguard ("Provisional Safeguard" (Art. 6)) was used in Japan for three agricultural products: spring onions, shiitake mushrooms, and tatami-grass mat covers, all of which are mainly imported from mainland China. This system allows for an increase in Customs tariffs to allow for a balance in the prices of domestic and imported products and can only be applied within 200 days.

Following strong lobbying from the Japan Eel Culture Associations, on 27 March 2001 Japan's Minister of Agriculture demanded that the Ministers of Finance and of Economics and Industries carry out preliminary research into the feasibility of applying such measures to eel imports. Several problems have arisen as a consequence of such research: an increase in Customs tariffs for a specific item should apply to all countries importing such goods. Taiwan, as a key exporter of eels to Japan (Table 4), would therefore also need to apply the same safeguard measures. The safeguard is a tentative action, and importing countries must make a counter measure in this period. Eel farmers in Japan have already cut their production costs many times (Otsuka, 1996), and are unable to do so again. In such a situation, the safeguard poses drawbacks for both exporting and importing countries. A number of concerned groups - among them the Japan Eel Culture Associations, the China Chamber of Commerce of Importers and Exporters of Foodstuffs, Native Produce and Animal By-Products, Taiwan Eel Development Funds and Japan Eel Importers Association - met to find ways to avoid application of these safeguard measures. Following the meetings, Japanese eel farmers insisted at first that the balance of supply and demand be modified by entering European Eel products in the market, and proposed that mainland China bans the importation of European Eel (Anon., 2002f). While China initially agreed to this proposal, it was vehemently opposed by eel farmers in some provinces of mainland China, and by the Japan Eel Importers Association. It was finally agreed that an import quota be established in mainland China for European glass eels, and a restriction placed on the number of ports of entry. The quota system was introduced at the start of the 2001 season and it is too early to assess its impact at the time of writing.

RETAIL MARKETS

Asia: Japan is the largest consumer of *Anguilla* eels. It consumed 140 000 t in 1999 (FIS, 2000a), estimated to be 57% of world production by green weight, and equalling some 800 million eels of traditional standard size in Japan (Table 11 shows green weight/product conversion factors). Japan produces less than 20% of eels for its own consumption, and imports 70-90% from mainland China (Figure 6). Comparing FAO and MOF data, mainland China exports about 60% of its eel products to Japan.

F. MUTO/TRAFFIC

A *kabayaki* take-away shop, Hasaki, Ibaraki Prefecture, Japan. To prepare the eel, the specimen is paralyzed by an electric current, its head fixed by a pick, and the body opened from the back to remove the spine.

F. MUTO/TRAFFIC

Frozen *kabayaki* on sale at Tsukiji market, Tokyo, Japan.

C. RAYMAKERS/TRAFFIC

Vacuum-packed fake glass eels (*surimi*), Seafood Expo, Belgium, 2001.

C. RAYMAKERS/TRAFFIC

Marinated eel fillets, Seafood Expo, Belgium, 2001.

F. MUTO/TRAFFIC

Packaged eel on sale in Shanghai market, China. Their robust body shape would suggest that these are European Eels - *kabayaki* style (left), and (right) for soup, with onion and ginger.

Japan only consumes adult eels. The most popular dish is *kabayaki* (Yamanaka and Tanaka, 2001) (see boxes, left). The peak time for consumption of this and other eel preparations is 18 days over July and August, and in particular on one or two days during that period, a tradition based on a combination of two ancient calendar systems which has been kept for several hundred years. Glass eels reared in an artificial pond early on in the season can reach commercial size by the following *kabayaki* season, which is cheaper than purchasing adult eels. Eel industries work throughout the month of August and those servicing Japan use the "eel year" calendar, which is from September to August. Statistics are sometimes gathered according to this calendar year.

This imbalance in the periods during which eels are consumed has an influence on the price. As mentioned above, the most suitable weight for eels used in *kabayaki* is around 150 g (Inaba, 1997b), and prices for eels of this size determine the prices for eels of other weights. Size preferences vary geographically, but the recent trend is for larger specimens (Anon., pers. comm., 17 September 2001). Eels weighing more than 150 g are priced low, or are not on sale in Japan; they are sometimes exported to Europe as smoked eels (Tsunogai, 1997).

In China, eels were formerly consumed mainly in Guangdong, Fujian, Jiangsu and Zhejiang provinces as a substitute for the eel-shaped fish *Fluta alba*, known as Yellow Eel (Shu, 1976). Some Chinese people never eat eel, believing that *Anguilla* eels eat the body of a drowned person, but this custom is changing. Live *Anguilla* eels and related products are now commonly available in markets in mainland China and Taiwan (Kuroda, 1998; Muto, pers. obs., November to December 2001). Most products, however, are exported to Japan.

South Korea traditionally consumed eels for medicinal purposes but over the past year eels, imported from Taiwan, have been served in restaurants (Anon., 2002f).

Europe: While wild-caught glass eels are mostly exported to China, almost all the European Eel catch and farmed specimens are consumed in Europe. The market mainly consists of the following eel sizes: young eels weighing 50-65 g (15-20 pieces/kg) available mainly in Italy, France and Portugal; medium-sized eels weighing 120-250 g (eight pieces/kg), popular in the Netherlands, and large specimens consumed, in particular, in Germany and, to a lesser extent, Spain (Nielsen, pers. comm., 2002).

Spain is the largest consumer of eels in Europe. Glass eels are used in appetizers known as *tapas*. Around 20 t of glass eels were imported in 1997 for domestic consumption, purchased by consumers at an average price of 100 ECU/1kg (USD125/kg) (Frost, 2001). However, the domestic market is unstable as consumers are not willing to pay more than 100 ECU/kg (Frost, 2001). If prices on the international market are higher, the Spanish market is not supplied.

The methods used to catch glass eels have an important bearing on their survival (see Fishing Methods); the damaging techniques employed in some areas of France, (in the Loire/Vilaine region, for example), together with the eels' natural mortality after they have been caught and are awaiting sale (according to a French fishmonger (pers. comm., 2001), about 10% of glass eels die within three to five days of being caught), means that there will always be bad quality batches on the market. Even though Spanish consumers prefer the highest

	1988		1989		1990		1991		1992		1993		1994		1995		1996		1997		1998	
	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg	t	ECU/kg
France	7.8	56.0	1.9	121.6	1.1	128.2	0.9	118.9	0.5	116.3	8.9	120.0	63.7	132.5	63.3	97.7	84.1	159.5	266.2	157.4	91.5	237.4
Belg./Lux.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	9.0	113.4	7.0	11.6	48.2
N'lands	0.1	4.3	2.1	9.8	1.9	8.9	1.0	26.8	1.3	29.0	2.1	10.0	5.8	27.2	3.5	34.9	50.3	12.5	3.9	158.7	14.0	17.7
Germany	1.8	48.2	8.6	31.8	4.6	22.1	0.9	102.9	2.3	113.3	5.1	90.9	4.1	71.2	4.1	89.1	4.5	69.9	16.5	176.0	16.0	238.8
Italy	0.3	9.8	1.9	12.9	6.8	28.4	23.6	6.5	0.6	9.0	0.4	23.2	0.8	8.1	11.0	4.5	-	-	0.6	12.7	1.2	8.3
UK	2.8	54.8	2.3	31.6	2.0	89.0	1.2	96.3	8.3	97.7	19.8	117.0	19.3	73.1	70.6	77.9	69.7	116.8	63.5	249.2	18.6	218.9
Ireland	-	-	-	-	-	-	0.6	6.5	-	-	-	-	0.3	0.0	-	-	0.6	21.5	-	-	-	-
Denmark	0.2	25.8	0.5	13.4	0.3	10.2	2.1	14.2	1.4	27.6	1.3	33.9	11.8	67.6	47.8	31.9	46.0	56.5	16.8	63.5	1.2	88.1
Greece	-	-	-	-	-	-	2.7	11.1	-	-	-	-	-	-	-	-	1.0	36.7	-	-	1.0	18.8
Portugal	-	-	-	-	1.0	11.0	-	-	-	-	-	-	-	-	-	-	0.2	159.3	-	-	-	-
Spain	0.3	47.4	-	-	-	-	16.3	47.5	13.7	80.3	0.8	26.7	0.1	34.7	0.8	88.8	5.0	154.8	3.8	246.2	4.6	282.6
Sweden	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	48.8	0.2	43.7
Total	**13.3**	**52.6**	**17.3**	**36.4**	**17.7**	**36.4**	**49.3**	**27.0**	**28.1**	**82.3**	**38.4**	**102.7**	**105.9**	**104.9**	**201.1**	**68.7**	**262.2**	**99.0**	**484.9**	**132.1**	**159.9**	**199.3**

Table 9. Eel exports (including glass eels), from EU to non-EU member states (in tonnes, values in [1]ECU/kg). [1]1 ECU = 1.099 USD in 1998. - = 0
Source: Anon., 1999b

quality product, the relatively short journey time to Spain could give damaged specimens sent from France a better chance of surviving long enough to allow them to develop their pigmentation before being cooked (Nielsen, 2000). But fish paste used to make fake glass eels (*surimi*) is taking over large parts of the real glass eel market, particularly in Spain.

CONCLUSIONS

Concerns about the origins and consequences of the decline in eel recruitment, the decline in and present level of existing fisheries, and the sufficiency of spawning stock abundance, has prompted a development of an Atlantic States Marine Fisheries Commission (ASMFS) interstate management plan for American Eels.

In 1998, the ICES/EIFAC Working Group on Eels, which has been compiling data on eels in Europe for more than a decade, recommended "*that an international rebuilding plan is developed for the whole stock. Such a rebuilding plan should include measures to reduce exploitation of all life stages and restore habitats. Until such a plan is agreed upon and implemented, ICES recommends that exploitation be reduced to the lowest possible level*".

Meanwhile, recruitment trends continue to show a decline, posing a serious threat to the future of the species, as well as to its fisheries and aquaculture (Dekker, 2002a). Several hypotheses for this decline have been suggested including overexploitation, pollution, habitat loss, parasites and diseases, or climatic changes (Bruslé, 1994; Moriarty and Dekker, 1997).

Is trade to Asia a driving force for the threat to European Eels?

A major decline in European Eel stocks has occurred since the middle of the 1900s (Dekker, 2002a) and during this time, European Eels have been consumed in large quantities in Europe, mainly by Spain. Since the 1990s, however, an increase in Asia's demand for European glass eels to supply eel farms has driven up glass eel prices, which, in turn, has stimulated smuggling. Substantial quantities are being purchased on the European market at "excessive" prices. Increasingly, European users of glass eels are out-competed and restocking programmes in certain European countries are consequently jeopardized (Moriarty and Dekker, 1997).

Although the immediate link between the increased demand for European Eel (glass eels) in Asia and the decline of the species population is still being debated (FIS, 1998; Dekker, pers. comm., 2002), it is at least clear that the involvement of Asian countries - particularly China - in the eel market has resulted in a trade that is more difficult to manage: live glass eels as well as semi-processed and processed eel products are now transported all over the world. Consequently the status of this resource has grown from being a small European fishery to one of global significance (Dekker, 2002a).

Taking remedial action

Whatever the cause of the decline, it is clear that a management plan for European eel stocks is urgently needed (Moriarty and Dekker, 1997; ICES, 2002). Therefore, considering the precautionary principle, various European experts have recommended taking measures to increase recruitment in order to enhance breeding stock and ultimately protect the eel in the wild. In particular, French experts have advised that the decrease in number and quality of silver eels reaching their spawning grounds, mostly owing to obstacles along their downstream migration and to the deterioration of freshwater quality in wetlands and rivers, should be reduced (Lambert and Feunteun, 1998). Guidelines for integrated river management have been proposed, including water catchment and hydraulic infrastructure measures, combined with international initiatives that tackle eel conservation issues in trans-border river basins and possibly also on an oceanic scale.

RECOMMENDATIONS

A number of recommendations should be acted upon by range States, countries and international institutions involved in the eel trade if the management of stocks is to be achieved:

TRADE

At present the international trade monitoring system in place to record eel markets around the world is weak and does not allow for the level of exploitation of the species at their different life stages to be estimated, or to ensure that the products are from legal sources. Suggestions to improve the current situation are set out below:

1. Improving the monitoring of international trade.

While much effort has been made to improve the monitoring of eel production, both from fishing and farming, much remains to be done on issues relating to the trade. Moreover, understanding commercial activities relating to eels through existing statistics is very difficult. Indeed, most data available on the international and European trade in eels concern live *Anguilla* spp. (EUROSTAT) or different types of products for commercial species (FAO). Japanese Customs officers were trained to separate information on imports and exports of "eel fry for fish culture" and "other live eel". This allows the statistics of the Ministry of Finance of Japan (e.g. Anon., 2002a) and secondary data cited by others (e.g. Anon., 1975-1998) to report on these different products. However, most national and international databases, such as EUROSTAT (European Union), do not distinguish trade in glass eels (specimens weighing about 1 g) from trade in silver eels (weighing several hundred grammes each), for instance. Under the Harmonized Commodity Description and Coding System, there is only one category for "Live *Anguilla* spp." (Code: 0301 92 00). As most international commercial trade of live eels concerns glass eels, it is recommended that Customs authorities in all countries trading in eels introduce a separate and standard code for this category of eel and another that covers all the other stages of the eel's life cycle. Until such a system between trading nations is in place, data relating to the eel trade and the role played by countries will remain unclear. Following the discrepancy between FAO and FIS data, all countries would contribute to the FAO work in its efforts to collect data in order to have a better understanding and vision of international trade in eels.

Given that eels are in trade at all stages of their life cycle, identification to species level is difficult. Establishment of practical identification guidelines is therefore essential.

2. Improving transparency in the chain of custody of glass eel catch and trade.

Following interest shown by traders in Asia and Europe on eel issues in general, there seems to be potential to involve all key stakeholders (fishermen, wholesale fish merchants, eel farming and processing industries, etc.) in creating a certification system and launching a "label" that would be verified by an independent - possibly government - body, to ensure that a product has been legally acquired and exported. In the European Union, such labelling could be seen as part of the implementation of Article 6 and 7 of *Council Regulation (EC) No 104/2000* of 17 December 1999. The promotion of such "labelling" is closely related to the need to raise consumers' awareness about the requirement for improved management of eel stocks in the wild. Consumers should be informed of the existence of such a "labelling" system, and its purpose. This could be made possible by promoting it at the retail market, particularly in Japan, to optimize its impact on trade channels.

3. Preventing the introduction of invasive eel species.

Despite suggestions that Asian countries should ban the importation of European glass eels (Matsumiya, 1999), the industry has grown so rapidly that any efforts

	Fresh or chilled eel			Frozen eel			Smoked eel			Main
	1977	1987	1997	1977	1987	1997	1977	1987	1997	species
Asia	4	-	104	-	-	3757	-	< 0.5	-	*A. japonica*
Australia	855	15	44	-	736	589	59	45	16	*A. australis*
America[1]	-	-	474	-	136	2526	-	-	-	*A. rostrata*
Europe	9268	9490	1732	876	890	737	367	317	368	*A. anguilla*
Others	15	26	4	-	-	15	-	-	1.5	Undetermined
Total	**10142**	**9531**	**2358**	**876**	**1762**	**7624**	**426**	**362.5**	**385.5**	

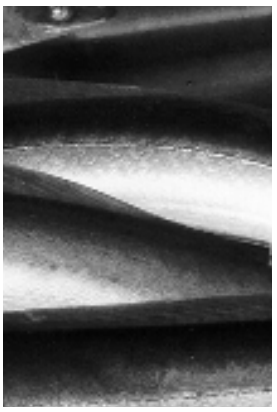
Table 10. Exports (in tonnes) of non-live eel products. - = 0 *Source: Anon., 2000b*
Main species are detected by biological distributions. [1]Mainly Suriname and Canada for chilled eel, and USA and Canada for frozen eel.

Categories	Main products	Exchange rate	Note
Eel (*Anguilla* spp.), live		1	
Eel, fresh or chilled	Meat with skin	1.43	
Eel, prepared or preserved	*Kabayaki* (baked in sauce)	1.79	
Eel, frozen	*Shirayaki* (baked)	1.54	Product from Asia
Eel, frozen	Smoked, whole	1.42	Product from EU
	Smoked, prepared	1.94	

Table 11. Names in statistics of import, and rate of conversion from product weight to green (original) weight. *Source: Tsunogai (1997)*

C. RAYMAKERS/TRAFFIC

THE LACK OF SUCCESS AT REPRODUCING EELS IN CAPTIVITY, AND THE CONSEQUENT DEPENDENCE ON SUPPLIES FROM THE WILD, POSES PERHAPS ONE OF THE GREATEST THREATS OF ALL TO THE SPECIES.



to impose such a ban would now be difficult to enforce. However, imports of exotic eel species must be fully controlled to prevent the introduction of new parasites and such controls could be improved by training enforcement agents to recognize the main eel species in trade. These measures could help in monitoring the trade.

Considering the counter actions established under the WTO safeguard, banning trade in European glass eels in mainland China is not realistic, but China should consider using a closed culture system to farm eels.

Article 13.2 of Japan's *Fishery Resource Protection Law*, established to prevent disease or the introduction of parasites on important native fish species, could be applied to invasive species such as *Anguilla* species.

Articles 16, 17, and 44 of mainland China's *Fisheries Law*, which recommend the inspection of fish seeds and stipulate that permission be sought to import fish seeds, could be applied to *Anguilla* eels (Shindo, 2001); Article 44 sets out penalties.

4. Consideration of listing in the CITES Appendices.

There are no international rules to monitor, control or limit international trade in eels. The listing of the American Eel in CITES Appendix III has been suggested by various authors (American Eel Plan Development Team, 2000; Anon., 1999c; Kim, 2000). It is at least as threatened as its European "relative", but certainly less threatened than the Japanese Eel.

A CITES Appendix II-listing of the entire genus is a possible approach as most *Anguilla* species are threatened to some degree and the difficulty of species identification would create enforcement problems. However, the status of at least one of the species would need to meet the biological criteria for listing. The main benefit of such a listing would be the improvement of information on international trade in glass, yellow and silver eels. Species, volumes, sources (farmed or wild), country of origin and destination, etc., would be reported, which would support better planning of catch levels in the various range States and provide the basis for guidance on the adoption of conservation measures.

CONSUMERS

The decline in eel numbers needs to be publicized and consumers persuaded to modify their choices and eating habits. Suggestions to improve the current situation are set out below:

1. Making consumers sensitive to eel issues.

Traditionally, eels are consumed during July and August in Japan; efforts could be made to change consumer tastes by discouraging consumption at other times of the year. After 1996, the balance between demand and supply was changed, and recently the market has been oversupplied. In order to find new markets, a number of advertisements designed to expand the season for eel consumption have been produced. If the Japanese tradition of consuming eels during the summer months is to be sustained, consumers must consider reducing consumption at other times of the year.

2. Promoting the consumption and culture of larger specimens.

After reaching a body weight of 350 g, the growth of the Japanese Eel slows down, while the European Eel continues to grow quickly. If larger eels were consumed, fewer eels overall would need to be caught to achieve the same total weight in trade.

RESEARCH AND INTERNATIONAL CO-OPERATION

Eels are among the most mysterious of fish species. Little is understood of their life cycle in the wild and the science of eel farming has so far failed to devise a way of raising larvae artificially. This lack of success at reproducing eels in captivity, and the consequent continuing dependence on supplies from the wild, poses perhaps one of the greatest threats of all to the species. Nonetheless, continued efforts must be made to maintain or enhance the species' survival in the wild.

1. Master the life cycle of eels in captivity.

Trials on eel biology are key to experiments on induced spawning; nutrition of eel juveniles should be promoted in Asia and Europe in order to produce greater quantities of glass eels in hatcheries and reduce dependence on wild specimens.

2. Research into the impact of invasive eel species.

Research is needed, particularly in mainland China where specimens of European Eel have escaped from farms and have apparently survived in the wild. The potential risks of competition for food and of the rather improbable, but eventually possible, interbreeding between European and Asian Eel species should be taken into consideration.

3. Stock assessment and enhancement: support and develop research on eels.

Supporting research: there is a need to define a joint assessment of wild stocks of eels. This step includes quantitative parameters of the world populations (distribution, structure and abundance) for each biological stage and qualitative ones (especially the "quality", e.g. fecundity, of spawners) in order to define appropriate stock enhancement targets. It is also necessary to improve the monitoring of eel stocks in order to appreciate the efficiency of stock enhancement programmes. Moreover, assessment of the changes in population parameters (migratory and sedentary populations) and fisheries at relevant times (e.g. the duration of the biological cycle), as well as the spatial scales (e.g. the hydrosystem) is necessary to evaluate the impact of restoration programmes. Furthermore, increased research into *Anguillicola crassus* to determine its possible effects on mature eel migration survival is needed.

Developing research: the Taiwan Fisheries Research Institute has been releasing hormone-induced mature Japanese Eels since 1976, but the effect on the eels is unknown (Kuo, 1999). In Japan, stock enhancement of Japanese Eels has been carried out by each fisheries association and, in 1999, the Japanese Fisheries Agency conducted joint research of the resource by stakeholders (Japan Fisheries Resource Conservation Association, 2001).

Because of the biological similarities between most *Anguilla* species, benefits from new research on anguillids may have a global application (Haro *et al*., 2000). Efforts to co-ordinate international research efforts and management approaches therefore need to be supported.

4. Enhancing international co-operation.

If one considers, as do many specialists, that European and American Eels are panmictic, there is clearly a need for international co-operation in fisheries management - in particular in monitoring and research and of harmonization of the various eel monitoring methods in place in various river systems in the EU. The building of a monitoring network in areas throughout the species' range (Europe and North Africa) could help provide information on the distribution of the eel and evolution of stocks at their different life stages. International programmes to improve knowledge about migration (paths and reproduction zones, for example) and the manner and conditions of reproduction of European eels and other species *in natura* should be developed. Also, consideration should be given to the creation of an international commission for the management of the European Eel stock that would be responsible for organizing monitoring and research on eel stocks and fisheries, and which would serve as a clearing house for the regular exchange of information regarding landings and resource status as well as facilitating and co-ordinating management action (ICES, 2002).

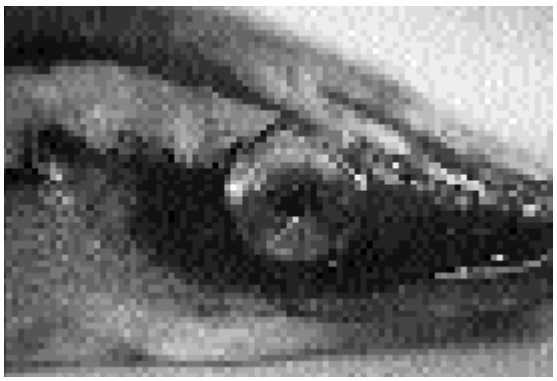
5. Stricter measures for the conservation of eels.

Owing to the lack of scientific information on the population dynamics and recruitment characteristics of eels and because of the panmictic nature of the species, a Total Allowable Catch (TAC) "strategy" is not appropriate. However, an agreement on catch limits for eels could be established in the EU, East Asia and North America. To this end, further biological research on stock and recruitment assessments and identification of escapement targets (i.e. the proportion of spawners surviving or escaping human-induced mortality and reaching the spawning area) should be carried out without delay. Consideration could be given to the measures in place in Miyazaki Prefecture, which has the strictest regulations relating to eel fisheries in Japan and where the "Fishery Promoting Center" - jointly funded by the prefecture and fisheries associations - is the only body permitted to fish and supply glass eels. This practice has started to eliminate the influence of mafias involved in the glass eel fishery/trade in this prefecture.

UNCLOS Article 67, established for the conservation of catadromous species such as eels and sturgeons, does not seem to be working well. It is hoped that international regulations for eel conservation could be established on the bases of Article 67.

FISHERIES

Stabilizing fisheries efforts to permit the recruitment of eels (at each biological stage) and to enable breeders (silver eels) to continue their journey to the sea should be the primary objective of measures taken by eel fishing nations around the world. Improved controls on fishing of both glass and silver eels, particularly in Europe, that are directly dependent on increased funding and commitment by governments to control poaching and related laundering activities to export eels are crucial to achieve this goal. Challenges faced by enforcement authorities are illustrated by the fact that these activities take place over several months and over a wide geographical area and which, in Europe for instance, may involve organized crime.


E. FELTNTELIN

There are currently no international laws to monitor, control or limit international trade in eels.

Action to be taken by national authorities to improve monitoring, control and management of eel fisheries could involve any or a combination of the following:

- introducing legislation that will require all sales and exports of eels to be licensed and registered;

- making controls easier by standardizing regulations that currently vary from country to country, or from region to region, and even within the same catchment area as is the case in France;

- reinforcing waterways control and surveillance during key important migration seasons, such as December to February in much of western Europe, when 80% of eels arrive at European coasts and estuaries, by creating teams composed of representatives from different administrations (police, fishing and hunting brigades, Customs, and veterinary inspection);

- increasing controls at the wholesale level in an effort to eradicate the laundering of glass eels from illegal sources;

- encouraging the judiciary to impose penalties for illegal activities as required under the provisions of fishing regulations and, where necessary, reviewing the level of such sanctions;

- encouraging fishermen to employ careful handling techniques similar to those now being used for the harvesting of live glass eels for eel culture in East Asia;

- defining landing size limits to help reduce excessive exploitation of yellow and silver eels;

- defining closed seasons (taking into account periods of vulnerability);

- encouraging a reduction in catches at all stages in the eel's life cycle;

- licensing fishermen, setting quotas for each licence and compulsory daily reporting of their catches which would help to limit and monitor the level of catches, create reliable landing statistics and contribute to information gathered on the Catch Per Unit Effort (CPUE);

- supporting restocking of glass eels in the wild when eel passes are not sufficient to maintain upstream migration;

- prohibiting the expansion of existing fisheries and the introduction of new fisheries.

HABITAT

Action on trade, fisheries and research will not have a positive impact on the status of eel populations so long as national and international authorities responsible for the management of freshwater systems are not involved in the reduction of habitat loss and the restoration of key areas, especially streams and wetlands. Such initiatives should be initiated as soon as possible through collaboration between fisheries and water-use authorities. This approach should include:

- taking measures to minimize obstructions, particularly to downstream migration of silver eels by installing appropriate fish passes and adapting the management of hydraulic works, for example;

- detecting the presence of pollutants in relevant river basins (e.g. residues of pesticides) and parasites that can possibly affect the growth and reproduction of eels, and adopting the necessary measures to restore the water quality; and

- identifying areas of specific importance to eels, for instance feeding and "resting" grounds and, on the basis of the local characteristics of eels and fisheries, declaring the most important ones as protected areas where no exploitation would be permitted.

ACKNOWLEDGEMENTS

With thanks to Markus Burgener, TRAFFIC East/ Southern Africa, for his comments on an early draft of this manuscript, and to colleagues at TRAFFIC East Asia-Japan. The following people are also thanked for their co-operation during the process of compiling information for this study: I.C. Liao, Taiwan Fisheries Research Institute; W.N. Tzeng, National Taiwan University of Taipei; M. Nishida, K. Tsukamoto, K. Tatsukawa, K. Aida, University of Tokyo; T.W. Lee, Chungnam National University of Republic of Korea; C.W. Park, Korea Ocean Research and Development Institute; N. Mochioka, Kyushu University; President C.T. Chen and Y. Tu, National Kaoshiung Institute of Marine Technology; H. P. Oka and N. Horie, Irago Institute; T. Iwata, Inland Fisheries Institute, Aichi Prefectural Fisheries Institution; K. Suzuki, Shizuoka Prefectural Fisheries Institution; Y. Ng and S. Lin, Taiwan Eel Development Funds; H.L. Wu Han-Lin and Xiao-Jie Dai, Shanghai Fisheries University; E. Zhan and L. Xu, Putong University; K. Tanaka, Isshiki Eel Culture Association; C. Tabata, Oosumi Eel Culture Association; N. Sato, T. Hieshima, Y. Saito, and Y. Takamura, Miyazaki Prefecture; President S. Takashima, Nihon Yoshoku Shinbun; Y.M. Wang, Bureau of Fisheries Management and Fishing Port Superintendence, Republic of China; H.F. Xu, TRAFFIC East Asia-China; G.C. Lei, WWF China; C.R. Kirkpatrick, TRAFFIC East Asia; S. Goshima of Hokkaido University; J.C. Avise, University of Georgia; S. Dufour, National Museum of Natural History, France; D. Jellyman and J. Boubée, National Institute of Water and Atmospheric Research Ltd of New Zealand; R. Lecomte, University of Perpignan, France; M.J. Miller, Ocean Research Institute, the University of Tokyo; T. Yamamoto, Japan Sea National Fisheries Research Institute, Fisheries Research Agency, Japan; M. Weber, Biologo Marino, Estação Litoral Agunda, Portugal; J.M. Casselman, Ontario Ministry of Natural Resources; A. Acou, Tour du Valat, France; E. Feunteun and A. Robinet, University of Rennes I, France; C. Jiaxin, Yellow Sea Fisheries Research Institute, China; C. Antunes, Centre for Marine and Environmental Research, Portugal; C. Briand, Management Institute of Vilaine, France; G. Castelnaud and P. Elie, CEMAGREF (Agricultural and Environmental Engineering Research), Bordeaux, France; T. Changeux, B. Rousseau and G. Simon, CSP (Superior Council of Fisheries), France; P. Steinbach, CSP, Regional Direction of Environment, Loire, France; I. Terrier, OFIMER (Interprofessional National Board for Sea and Fish-farming products); L. Vilaine, President of the Commission of Migratory Fishes and Estuaries, France; C. Guernalec, General Secretary of the National Committee of Marine Fisheries and Marine Cultures, France; D. Mahaud, professional fisherman, Adour, France; M.-A. Marcellier, Director of the North Atlantic Salmon Fund, France; C. Moriarty, University of Dublin, Ireland; W. Dekker, Chairman of the ICES/ EIFAC Working Group on Eels, Institute for Fisheries Research, Netherlands; B. Bauduin and P. Pilliteri, DGDDI (Directorate General of Customs and Excise), France; B. Boutbien, DGCCRF (French Competition and Consumer Protection Agency), France; P. Boisneau, President of the National Co-ordination of Professional Fishing in Freshwater, France; I. Costa and T. Fournigault, Brigade Convention of Washington of ONCFS (National Hunting and Wildlife Office), France; J. Allardi and P. Keith, Ministry of Landing Management and Environment, France; F. Volckaert, Laboratory of Aquatic Ecology, Belgium; H. Wickstom, Institute of Freshwater Research, Sweden; G. Sancho, Fisheries Resources Department, AZTI, Spain; G. Fontenelle, ENSAR (National Institution of Higher Learning in Agronomica), France; R. Gascoin, National Union of Fishing and Fish Farming Fédérations, France; F. Grebo, Association Truit-Ombre-Salmon, France; A. Legault, Fish Pass, France; T. Nielsen, France; P. Prouzet, IFREMER (French Research Institute for the Management of Maritime Resources), France; C. Dennison, General Secretary of the Eel Study Group, UK; M.V. Ninassi, D. Moreau, M. Arnould, V. Graffin and L. Debas, WWF France. Mr Shimazaki of Hokkaido University assisted with finding the black and white cover illustration.

The authors would also like to express their sincere thanks to an eel trader in Japan, who shall remain anonymous, for providing information relating to trade routes, customs and traditions of Japan's domestic eel trade.

REFERENCES

American Eel Plan Development Team (2000). Interstate fisheries management plan for American Eel. http://www.asmfc.org/. Atlantic States Marine Fisheries Commission, USA. Cover + xiii +79pp.

Anon. (1969-2000). *Gyogyô Yôshoku-gyô Seisan Tôkei Nen-Pô*. [Statistics of production of capture and aquaculture for calendar year.] Norin Suisan Shô Tôkei Jôhô Bu, Tokyo, Japan.

Anon. (1975-1998). Japanese imports of marine products (statistics). (1974-1997). Japan Marine Products Importers Association. Tokyo, Japan.

Anon. (1998). Commerce Exterieur des Produits de la Mer et de l'Aquaculture, OFIMER Rapport Annuel. Pp.1-72.

Anon. (1999a). *La filière Anguille, d'après le dossier d'étude de l'ISARA*. Cogepomi RMC, DIREN - Délégation de bassin. 31pp.

Anon. (1999b). Exports of *Anguilla* spp. from European Union member countries. 1988-1998. EUROSTAT. Comext2 k0234947.prt. 13 October.

Anon. (1999c). American Eel Board approved draft eel FMP: final approval slated for November. *ASMFC Fisheries Focus*, 8(8/9):4.

Anon. (2000a). Commerce extérieur des produits de la mer et de l'aquaculture. *OFIMER Rapport Annuel 2000*. Pp.1-73.

Anon. (2000b). Commodities trade and production of fishery products 1976-1999.ftp://ftp.fao.org/fi/stat/windows/fishplus/fishcomm. zip. The Food and Agricultural Organization. FISHSTAT: ftp://ftp.fao.org/fi/stat/windows/fishplus/fst_plus.zip.

Anon. (2001a). Total production 1950-2000. ftp://ftp.fao.org/fi/stat/windows/fishplus/fstat.zip. The Food and Agricultural Organization for FISHSTAT:ftp://ftp.fao.org/fi/stat/windows/fishplus/fs_plus.zip.

Anon. (2001b). Aquaculture production: quantities 1970-2000. ftp://ftp.fao.org/fi/stat/windows/fishplus/aquaq.zip The Food and Agricultural Organization. FISHSTAT: –ftp://ftp.fao.org/fi/stat/windows/fishplus/fst_plus.zip.

Anon. (2001c). Capture production 1970-2000. ftp://ftp.fao.org/fi/stat/windows/fishplus/capdet.zip. The Food and Agricultural Organization. FISHSTAT: ftp://ftp.fao.org/fi/stat/windows/fishplus/fst_plus.zip.

Anon. (2001d). Report of the ICES Advisory Committee on Fishery Management. Copenhagen, 22-31 May 2001, Copenhagen 9-17 October 2001. ICES *Cooperative Research Report* 246. International Council for the Exploration of the Sea. Copenhagen, Denmark. Three volumes.

Anon. (2001e). World Register of Dams. http://www.dams.org. ICOLD.

Anon. (2002a). Trade Statistics. Year of month [sic]. Commodity by country. http://www.customs.go.jp/toukei/download/index_d011_e.htm. 24 September.

Anon. (2002b). Agricultural item list. http://www.moftec.gov.cn/moftec_cn/tga/taiwan/taiwan-2-a.html. Ministry of Foreign Trade and Economic Co-operation, People's Republic of China. 15 February.

Anon. (2002c). Tariff search. Department of Customs, Administration Ministry of Finance, Republic of China. 15 February.

Anon. (2002d). A brief history of Eel farming. http://www.eelfry.com. Wai Kee Industrial Co. 5 October 2001.

Anon. (2002e). *Customs tariff schedules of Japan 2002*. Japan Tariff Association, Tokyo. 997pp. [In Japanese and English]

Anon. (2002f). *Nihon Yôshoku Shinbun, compiled edition for year 2001*. The Nihon Yôshoku Shinbun, Tokyo. [In Japanese]

Anon. (2002g). Catching methods of glass eels. http://www.glasseel.demon.co.uk./Catching%20Methods.html. UK. July.

Anon. (2002h). Eel farming in Taiwan. http://www.american.edu/projects/mandala/TED/eelfarm.htm. August.

Antunes, C. and Tesch, F.N. (1997). A critical consideration of the metamorphosis zone when identifying daily rings in otoliths of European eel, Anguilla anguilla (L.). *Ecology Freshwater Fish* 6:102-107.

Aoyama, J. and Tsukamoto, K. (2001). Identification of eel species by genetic analysis. In: Japan Fisheries Resource Conservation Association (ed.) (2001). Naisuimen Juyôsyu Sigennzôdai Taisaku Itakujigyô *(Unagi Shigen Chosa)* (eel resource research). Japan Fisheries Resource Conservation Association, Tokyo. Pp. 129-133. [In Japanese]

Aoyama, J., Watanabe, S., Miyai, T., Sasai, S., and Nishida, M. (2000). The European Eel, *Anguilla anguilla* (L.), in Japanese waters. *Dana* 12:1-5.

Ashworth, S.T. and Blanc, C. (1997). *Anguillicola crassus*, a recently introduced aggressive coloniser of European Eels stocks. *Bulletin Français de la Pêche et de la Pisciculture* 344/345:335-342.

Avice, J.C. (2001). Catadromous eels of the North Atlantic: a review of molecular genetic findings relevant to natural history, population structure, speciation, and phylogeny. In: Aida, K., Tsukamoto, K. and Yamauchi, K. (eds), *Proceedings of the International symposium: Advanced Eel Biology*. Research for the Future Program, Japan Society of the Promotion of Science. Pp. 4-6.

Briand, C., Fatin, D., Fontenelle, G. and Feunteun, E. (in press). Estuarine and fluvial recruitment of European glass eel in an Atlantic exploited estuary. *Fisheries Management and Ecology.*

Bruslé, J. (1994). L'anguille Européenne, *Anguilla anguilla*, un poisson sensible aux stress environnementaux et vulnérable à diverses atteintes pathogènes. *Bulletin Français de la Pêche et de la Pisciculture* 335:237-260.

Castelnaud G., Guerault D., Desaunay Y. and Elie, P. (1994). Yield and abundance of the glass eel (*Anguilla anguilla* L.) at the beginning of the nineties. *Bulletin Français de la Pêche et de la Pisciculture* 335:263-287.

Castelnaud, G. (2000). Fishing location, fishermen and production of migratory species fisheries in the French rivers. *Bulletin Français de la Pêche et de la Pisciculture* 357/358:439-460.

Castelnaud, G. (2002). *Caractéristiques de la pêcherie civellière du golfe de Gascogne*. Contrat européen n°99/023. IFREMER, CEMAGREF, Groupement de Bordeaux. 32pp.

Dekker, W. (2000a). The fractal geometry of the European Eel stock. *ICES Journal of Marine Science* 57(1):109-121.

Dekker, W. (2000b). A Procrustean assessment of the European Eel stock. *ICES Journal of Marine Science* 57(4):938-947.

Dekker, W. (2002a). Status of the European Eel stock and fisheries. Proceedings of the International Symposium: Advances in eel biology, University of Tokyo, September 2001 (in press).

Dekker, W. (ed.) (2002b). Monitoring of glass eel recruitment. Netherlands Institute of Fisheries Research, report C007/02-WD, 256 pp.

Dufour, S. (1996). An example of a reproductive cycle under environmental control: the case of eel. *Comptes Rendus des Séances de l'Académie d'Agriculture de France* 82(7):17-26.

FAO (1993). Report of the Eighth Session of the Working Party on Eel. Olsztyn, Poland, 24-29 May 1993. *EIFAC Occasional Papers*, 27:21.

FIS (Fish-Info Service) (1998). Eel market report. The European Eel Resource. Published fortnightly at http://www.fis.com.

FIS (Fish-Info Service) (2000a). Eel market report. Consumption of eel in Japan form 1991 to 1999. Published fortnightly at http://www.fis.com.

FIS (Fish-Info Service) (2000b). Anguilla Eel farming in China. Consumption of eel in Japan from 1991 to 1999. Published fortnightly at http://www.fis.com.

Fontaine, Y.-A. (2001). *Les anguilles et les hommes.* Odile Jacob (ed.). 226 pp.

Fontenelle, G. (1997). Observations on the glass eel fishery. In: Moriarty C. and Dekker W. (eds). Management of the European Eel. *Marine Institute* 15:108-109.

Frost H. (2001). A socioeconomic cost-benefit analysis of the use of glass eel. Rapport nr. 118. Ministeriet for Fodevarer, Landbrug og Fiskeri, Copenhagen, Denmark. 68 pp.

Guangwei, D., and Shishun, L. (1999). Analysis of impetuses to change agricultural land resources in China. *Bulletin of the Chinese Academy of Science* 13(1).

Han, Z.C. (1999). Chapter IV. Fresh water culture of European Eel. In: Xie, Z.M. (ed.), *European Eel: Culture techniques.* Chinese Agriculture Publishing, Beijing. Pp. 41-131. [In Chinese]

Han, Y.S., Yu, C.H., Yu, H.T., Chang, C.W., Liao, I.C., and Tzeng, W.N. (in press.) The exotic American Eel *Anguilla rostrata* (Le Sueur) identified in Taiwan: Ecological implications. *Journal of Fish Biology*.

Haro, A., Richkus, W., Whalen, K., Hoar, A., Busch, W.-D., Lary, S., Brush, T. and Dixon, W. (2000). Population decline of the American Eel: implications for research and management. *Fisheries management* 25(9):7-15.

ICES (1994). Report of the 1994 session of the joint EIFAC/ICES Working Group on Eel from the meeting in Oviedo, Spain, 26 September-1 October 1994. EIFAC occasional paper 30:21 pp.

ICES (1996). Report of the second session of the joint EIFAC/ICES Working Group on Eel from the meeting in Ijmuiden, the Netherlands, 23-27 September 1996. EIFAC occasional paper 33:21 pp.

ICES (1999). ICES cooperative research report no. 229, Report of the ICES Advisory Committee on Fisheries Management, 1998. Part 2, 446 pp.

ICES (2000). Report of the EIFAC/ICES Working Group on Eels from the meeting in Silkeborg, Denmark, 20-24 September 2000. ICES CM 2000/ACFM. 6:27 pp.

ICES (2002). Report of the EIFAC/ICES Working Group on Eels from the meeting in ICES Headquarters, 28-31 August 2001. ICES CM 2002/ACFM. 3:54 pp.

Inaba, S. (1997a). Chapter V. Types of methods of culture, and merit/demerit of each. In: Inaba, S., Matui, I., Aoe, H., Tsunogai, H. and Oogami, H. (eds), *Lecture of Fish Culture. 9th edition 7. Eel.* Midori-Shobo, Tokyo. Pp. 38-60. Shiiku Hôhô No Shurui To Tokushoku. In: *Yôgyo Kôza Dau 7 Kan. Unagi*. [In Japanese]

Inaba, S. (1997b). Chapter VII. Material for ranching, and their capture. In: Inaba, S., Matsui, I., Aoe, H., Tsunogai, H. and Oogami, H. (eds), *Lecture of Fish Culture. 9th edition* 7. Eel. Midori-Shobo, Tokyo. Pp. 83-89. Shubyô To Saiho In: *Yôgyo Kôza Dai 7 Kan. Unagi.* [In Japanese]

Isono, T. (1999). Glass eel immigration to land. *Kaiyo Monthly* ex (18):156-163. [In Japanese]

Japan Fisheries Resource Conservation Association (ed.) (2001). *Naisuimen Juyôsyu Sigennzôdai Taisaku Itakujigyô (Unagi Shigen Chosa)* (eel resource research). Tokyo. 168 pp. [In Japanese]

Kato, M. (1999). Resource of Japanese Eel: decline, reasons, and measures. *Kaiyo Monthly* ex (18):174-177. [In Japanese]

Keith, P. and Allardi, J. (co-ord.) (2001). Atlas des poissons d'eau douce de France. *Patrimoines Naturels*, 47:387pp.

Kim, L.S. (2000). Atlantic States Marine Fisheries Commission prioritized research needs in support of interjurisdictional fisheries management. http://www.asmfc.org.

Kimura, S., Inoue, T. and Sugimoto, T. (1999). Transportation system of larval Japanese Eel. *Kaiyo Monthly* ex (18):53-59. [In Japanese]

Knights, B., White, E. and Naismith, J.A. (1996). Stock assessment of European Eel, *Anguilla anguilla* L. In: Cowx, I.G. (ed.). *Stock assessment in inland fisheries*. Hull International Fisheries Institute. University of Hull, UK. Pp. 431-447.

Knights, B. (1997). Risk assessment and management of contamination of eels (*Anguilla* spp.) by persistent xenobiotic organochlorine compounds. *Chemistry and Ecology* 13(3):171-212.

Kuo, C.L. (1999). Research of eel resources in Taiwan. *Kaiyo Monthly* ex (18):171-173. [In Japanese]

Kuroda, T. (1998). *Kôryû De Manabu Chûgoku Suisan.* [=Chinese Fisheries, learning by friendly relationship.] Seizandô, Tokyo. 5+247 pp. [In Japanese]

Kuroda, C. (1999). 1.4. Freshwater aquaculture in China. *Kaigyokyô(Shi)* 156:83-96. [In Japanese]

Lambert, P. and Feunteun, E. (1998). Compte rendu des journées anguilles de Paimpont du 23 au 25 septembre 1998. Rapport GRISAM/Groupe Anguille, 8 pp. + annexes.

Lee, W.T., Pak, S., and Pak, C.W. (1999). Recent state of research of eel resources in Republic of Korea. In: Tatsukawa, K., Matsumiya, Y. and Tsukamoto, K. (eds). *Proceedings of symposium: Present Status and Conservation Measures of Eel Resources.* Ocean Research Center of the University of Tokyo, Tokyo, Japan. P.25.

Lelek, A. (1980). *Les poissons d'eau douce menacées en Europe*. Collection sauvegarde de la nature (Conseil de l'Europe). Strasbourg, France. 275 pp. [In French]

Liao, I.C. (1999.) Aquaculture in Taiwan. *Kaigyokyo (Shi)*, 156:141-169. [In Japanese]

Liao, I.C., Liao, S. K., Kuo, C.L., Tzeng, W.N., and Kuo, C.L. (1999). Leptocephalus research by r.v. Fishery Researcher 1. *Kaiyo Monthly* ex (18):27-33.

Luneau, S. (1998a). Un marché asiatique juteux. *Eaux libres 2*4:18-19.

Luneau, S. (1998b). Elevage en Chine: les revers du succès. *Eaux libres* 24:20-22.

Matsuda, H. (1999). Resource management from point of view of biological resource conservation. In: Aida, K., Tsukamoto, K. and Yamauchi, K. (eds), *Proceedings of symposium: Present Status and Conservation Measures of Eel Resources.* Ocean Research Center of the University of Tokyo, Tokyo, Japan. Pp. 47-48.

Matsumiya, Y. (1999). Problems on import and release of eels, and perspective on the stock enhancement. In: Aida, K., Tsukamoto, K. and Yamauchi, K. (eds), *Proceedings of symposium: Present Status and Conservation Measures of Eel Resources.* Ocean Research Center of the University of Tokyo, Tokyo, Japan. Pp. 54-55. [In Japanese]

Matsumiya, Y., Tatsukawa, K. and Sakai, T. (1999). Analysis of catch data of glass eels and resource problems. In: Aida, K., Tsukamoto, K. and Yamauchi, K. (eds), *Proceedings of symposium: Present Status and Conservation Measures of Eel Resources.* Ocean Research Center of the University of Tokyo, Tokyo, Japan. P.37. [In Japanese]

Mochioka, N. (2001). Leptocephalus. In: Tatsukawa, K., Matsumiya, Y. and Tsukamoto, K. (eds). *Proceedings of the International symposium: Advanced Eel Biology.* Research for the Future Program, Japan Society of the Promotion of Science. Pp. 10-11.

Moriarty, C. and Dekker W. (1997). Management of the European Eel. *Fisheries Bulletin (Dublin)* 15:1-125.

Muchiut, S., Gallet, F., and Aubin, D. (2002). Principaux facteurs à prendre en compte pour une meilleure gestion de l'anguille européenne *Anguilla anguilla.* Institut des Milieux Aquatiques. Observatoire des pêches et des cultures marines du golfe de Gascogne. 4 pp.

Nelson, J.S. (1994). *Fishes of the World. Third edition.* John Wily & Sons, Inc., New York, USA. 600 pp.

Nielsen, T. (1998). Elevages en Chine: les revers du succès. *Eaux libres* 24:20-22.

Nielsen, T. (2000). Trading and transport of European glass eels for aquaculture purpose. http://www.ifrance.com/euroeel. June 2002.

Otsuka, H. (1996). Economics of eel culture. Nôrin Tôkei Kyôkai, Tokyo. 212 pp. (In Japanese with English summary)

Perraudeau, Y. (2000). "Les pêches maritimes estuariennes françaises en 1997-1998 (hors Méditerranée)": note de synthèse sur l'étude socio-économique (LEN-CORAIL, oct. 2000), 4 pp.

Rigaud, C. (1998). Des connaissances en pleine évolution. *Eaux libres.* 24:11-12.

Robinet, T. and Feunteun, E. (2001). Sublethal effects of exposure to chemical compounds: a cause for the decline in Atlantic eels? *Ecotoxicology* 11:265-277.

Sawada, T. and Yanagisawa, T. (2001). Aichi-ken. In: Japan Fisheries Resource Conservation Association (ed.) (2001).

Naisuimen Juyôsyu Sigennzôdai Taisaku Itakujigyô (Unagi Shigen Chosa) [eel resource research]. Japan Fisheries Resource Conservation Association, Tokyo. Pp. 42-48.

Schmidt, J. (1922). The breeding places of the eel. *Philosophical Transactions of the Royal Society of London. Series B* 211; 179-208.

Shi, D.L. (1993). Glass eel of Yangtze River at Chongming Isl., usage and management of resources. *Marine Fishery* 15(6):264-266. [In Chinese]

Shindo, S. (2001). On the Chinese Fisheries Law which was amended after an interval of 14 years. *Kaigai Gyogyô Kyôryoku* (18):1-21. [In Japanese]

Shu, T.S. (=Zhou, D.S.) (1976). Description of foods in China. Sogensha, Osaka. ii+259+18 pp.+map. [In Japanese]

Taillebois, L. (1998). Deux mareyeurs épinglés. *Eaux libres* 24:32-33.

Tabeta, O. (1991). Eel species of the world suitable for culture. *Aquaculture* 39(2):224-225. [In Japanese with English title]

Tabeta, O., Takai, T., and Matsui, I. (1977). On the foreign eels in Japan. *Aquaculture* 24(4):116-122. [In Japanese]

Tabeta, O., Nonaka, S., and Tanase, N. (1979). Occurrence of elvers of European Eel, *Anguilla anguilla* L. in Shizuoka and Kanagawa Prefectures, Japan, in 1977. *Bulletin of Japanese Society of Fisheries Sciences* 45(4):437-441. [In Japanese with English summary]

Tanaka, K., Oka, H., and Motonobu, T. (1999). Sagitta in gut contents of leptocephali. *Kaiyo Monthly* ex (18):113-117. [In Japanese]

Tatsukawa, K. (2001). The present state of population dynamics studies on unagi, *Anguilla japonica. Aquabiology* 133(23):108-114. [In Japanese]

Tatsukawa, K., and Matsumiya, Y. (1999). Resource management and conservation of Japanese eel: the start of research of Japanese Eel. *Kaiyo Monthly* ex (18):148-155. [In Japanese]

Temminck, C.J. and Schlegel, H. (1846). *Anguilla japonica*. P. 258, Pl. 13 (fig. 1). In: *Pisces. Fauna Japonica*, sive descriptio animalium quae in itinere per Japoniam suscepto annis 1823-30 collegit, notis observationibus et adumbrationibus illustravit P.F. de Siebold. Parts 10-14.

Tesch, F.W. (1977). *The Eel. Biology and Management of Anguillid Eels*. Chapman and Hall, London, UK. xiv+434 pp.

Tsukamoto, K. (1992). Discovery of spawning area for Japanese Eel. *Nature* 356 (6372):789-791.

Tsukamoto, K., Nakai, I., and Tesch, W.V. (1998). Do all freshwater eels migrate? *Nature* 396:635.

Tsunogai, H. (1997). Chapter XIV. Processing and cooking. In: Inaba, S., Matui, I., Aoe, H., Tsunogai, H. and Oogami, H. (eds), *Lecture of Fish Culture. 9th edition* 7. *Eel*. Midori-Shobô, Tokyo. Pp.229-239. Kakou to Ryouri. In: Inaba *et al*. (ed.). *Yougyô Kouza Dai 7 Kan*. Unagi. [In Japanese].

Tzeng, W.N. (1997). Short and long-term fluctuations in catches of elvers of the Japanese Eel, *Anguilla japonica*, in Taiwan. In: Hancock and Smith. (eds), *Developing and sustaining world fisheries resources. Proceedings of 2nd World Fisheries Congress.* CSIRO press. Pp.85-89.

Tzeng, W.N. (1999). Glass eel in Taiwan, resource and ecological research. *Kaiyo Monthly* ex (18):164-170. [In Japanese]

Varadi, L., Szucs, I., Pekar, F., Blokhin, S. and Csavas, I. (2001). Aquaculture development trends in Europe. In: Subasinghe, R.P., Bueno, P., Phillips, M.J., Hough, C., McGladdery, S.E. and Arthur, J.R. (eds). Aquaculture in the Third Millennium. *Technical Proceedings of the Conference on Aquaculture in the Third Millennium, Bangkok, Thailand, 20-25 February 2000*. Pp.397-416. NACA, Bangkok and FAO, Rome.

Watanabe, S. (2000). Taxonomy of the freshwater eels, genus *Anguilla*. *Aquabiology* 133(2):115-122. [In Japanese with English abstract]

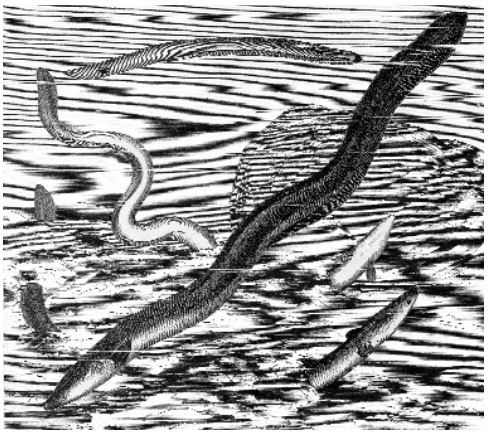
Williamson, G. R. and Tabeta, O. (1991). Search for *Anguilla* eels on the west coast of North America and on the Aleutian and Hawaiian Islands. *Japanese Journal of Ichthyology* 38(3):315-317.

Wirth, T. and Bernatchez, L. (2001). Genetic evidence against panmixia in the European Eel. *Nature* 409:1037-1040.

WTO (World Trade Organization). (1995). Annex 1. A Multilateral Agreements on Trade in Goods. Agreement on Safeguard. In: World Trade Organization, *Agreement Establishing the World Trade Organization*. http://www.wto. org//english/docs_e/legal_e/05-anx1a.pdf Pp. 273-281. 16 May 2002.

Yamanaka, H., and Tanaka, T., (2001). *Suisanbutsu no Riyou. Genryou Kara Kakou/Chori Made. Kaitei Ban.* [*Utility of fisheries products. From materials to processing/cooking. Amended edition*.] Seizando, Tokyo. 2+10+172pp. [In Japanese]

Zhang, H., Mikawa, N., Yamada, Y., Horie, N., Okamura, A., Uto, T., Tanaka, S., and Motonobu, T. (1999). Foreign eel species in the natural waters of Japan detected by polymerase chain reaction of mitochondrial cytochrome *b* region. *Fisheries Sciences* 65:684-686.



Stéphane Ringuet, *Programme Officer, TRAFFIC Europe-France, c/o WWF-France, 188, rue de la Roquette, F75011, Paris, France. E-mail: sringuet@wwf.fr*

Fumihito Muto, *Regional Fisheries Officer, TRAFFIC East Asia-Japan, 6th Fl. Nihonseimei Akabanebashi Bldg., 3-1-14, Shiba, Minato-ku, 105-0014 Tokyo, Japan. E-mail: muto@klact.co.jp*

Caroline Raymakers, *Director, TRAFFIC Europe, Bd Emile Jacqmain 90, B-1000 Brussels, Belgium. E-mail:craymakers@traffic-europe.com*

Traditional Asian Medicine
Identification guide for law enforcers

One of the great difficulties that all enforcement agencies face is trying to identify the enormous variety of animal and plant species listed under the CITES Convention. There are a number of excellent guides available that assist considerably in the day to day process of identifying live animals and skins and experts are also generally available to help out. One area of particular difficulty that officials are increasingly faced with, however, is that of traditional Asian medicine. Unless the enforcement officer is fluent in Chinese or other Asian languages, it is not always clear from the packaging what ingredients are listed in the medicine.

The publication of a comprehensive guide to make identification of traditional Asian medicines easier for those in enforcement is therefore particularly welcome. Produced by HM Customs & Excise and TRAFFIC International, the guide includes over 430 full colour images of packages that have been found in trade. The lists of ingredients on these packages have been translated and any inclusion of a regulated species is indicated. By comparing packages and their ingredients found in shipments against those described and illustrated in the manual, it is possible to have an informed idea of whether any of the medicine's contents are controlled or not. The guide also provides good background information on traditional Asian medicine, the main target species used, and a translation of some of the common Chinese words used to list the ingredients.

My congratulations go to my colleague Grant Cameron for the extra time and effort he put into providing the pictures and tables included in this guide, and to TRAFFIC International for completing the contents and being responsible for its subsequent publication.

Though comprehensive, this guide cannot cover all traditional Asian medicines found in trade, and it is hoped that in the coming years updates will be produced to supplement it. Many thanks go to WWF-UK, the CITES Secretariat, the UK Partnership for Action against Wildlife Crime and Taiwan's Council of Agriculture for providing funding, without which production of this guide would not have been possible.

Charles Mackay, *Senior Officer, CITES Team, HM Customs & Excise, Heathrow Airport*

Sample page from Traditional Asian Medicine Identification Guide for Law Enforcers illustrating a selection of packages containing plasters that list ingredients derived from CITES-listed species.

A selection of packages listing wildlife ingredients:

Powder said to contain Saiga Antelope.

Pills with ingredients listing bear bile.

Hui Chun Tan Chu Pai Bird Nest, a powder from China listing *Gastrodia* and *Costus* spp. in its ingredients.

Tiger mentioned in medicine product name but not in the ingredients.

TRAFFIC REPORTS

The following TRAFFIC reports are now available or will shortly be published. For details of availability/expected publication dates, contact TRAFFIC International or the relevant TRAFFIC office indicated.

Prickly Trade: Trade and Conservation of Chihuahan Desert Cacti — TRAFFIC North America
(In prep.). C. Robbins

Management and Trade of Whale Sharks in Taiwan — TRAFFIC East Asia-Taipei
September 2002. 25 pp. *V.Y. Chen and M.J. Phipps*

In the Black. Status, Management, and Trade of the American Black Bear (*Ursus americanus)* in North America — TRAFFIC North America
April 2002. 161 pp. *Douglas F. Williamson*

Uncharted Waters: Implementation Issues and Potential Benefits of Listing Toothfish in Appendix II of CITES — TRAFFIC Oceania/International
2002. 36 pp. *Anna Willock*

The Lion's Share of the Hunt - Trophy Hunting and Conservation: A Review of the Legal Eurasian Tourist Hunting Market and Trophy Trade under CITES — TRAFFIC Europe
March 2002. 69 pp. *Doris Hofer*

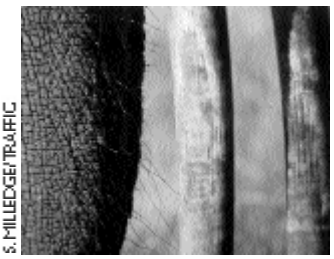
Other Reports in Preparation:

- Attitudes of South Korea's traditional medicine practitioners about wildlife conservation — TRAFFIC East Asia
- Sport-hunting in the SADC region — TRAFFIC East/Southern Africa
- Summary report on the Elephant Trade Information System (ETIS) — AVAILABLE AT WWW.CITES.ORG
- Bear gall bladder trade in Japan (in Japanese and English) — TRAFFIC East Asia
- A survey of the commercial trade in whale meat products in Japan (in Japanese and English) — TRAFFIC East Asia
- A study on Malaysia's timber trade — TRAFFIC Southeast Asia

Online Reports Now Available

The *TRAFFIC Online Report Series* hosts TRAFFIC reports published primarily in a PDF file format on TRAFFIC's website (www.traffic.org). Reports in the series feature new research results and policy analyses for priority issues TRAFFIC is working on as part of its ongoing efforts to ensure that wildlife trade is not a threat to the conservation of nature. Notification of on-line publications are sent to target audiences and partner organizations and printed copies of the reports are also provided to key reference libraries.

- CITES Appendix III implementation for Big-leafed Mahogany *Swietenia macrophylla.*


S. MILLEDGE/TRAFFIC

- An assessment of the illegal trade in elephants and elephant products in Viet Nam.

- An assessment of China's management of trade in elephants and elephant products.

- Retail markets for ivory in Taiwan still persist.

- Trade in Asian Elephants and their derivatives in Myanmar continues.

- Japan's trade in ivory after the tenth meeting of the Conference of the Parties to CITES.

TRAFFIC MAILING DATABASE FORM

Title Mr/Mrs/Ms/Other _____ Reference No. _____

Organization _____

Nature of business (type 'X' in the square brackets, where appropriate)

[ ] Education
[ ] Enforcement agency
[ ] Government authority
[ ] Conservation organization
[ ] Media/Communications
[ ] Commercial
[ ] Individual
[ ] Other *Please specify* _____

Name _____ **Position** _____

Address _____

_____

Post/Zip code _____ **Country** _____

Website _____ **E-mail** _____

Tel. Number _____ **Fax Number** _____

[ ] **Please type 'X' in this square bracket if your contact details have changed.**
[ ] **Please type 'X' in this square bracket if you wish to CANCEL your subscription to the *TRAFFIC Bulletin.***

Please type 'X' in appropriate brackets below if you wish to be informed of other TRAFFIC publications relevant to your areas of interest:

[ ] animal species threatened by trade
[ ] plant species threatened by trade
[ ] fisheries trade
[ ] timber and wood products trade
[ ] other *Please specify* _____
[ ] medicinal plant trade
[ ] traditional medicine
[ ] wildlife trade impacts on priority ecoregions
[ ] international treaties and wildlife trade

[ ] Please type 'X' in this square bracket if you do **NOT** wish to receive news of other TRAFFIC publications

I would like to contribute towards the production of the TRAFFIC Bulletin or other important activities of TRAFFIC

I enclose a cheque/international money order for_____ made payable to TRAFFIC International

GIFT AID DECLARATION

Please tick box below if you wish TRAFFIC to reclaim the tax on your gift (if you are a UK taxpayer).

I would like TRAFFIC to reclaim the tax on this donation, and any further donations I make from the date of this declaration until I notify you otherwise.

Signature: _____ Date _____

DATA PROTECTION: Personal data is gathered in accordance with the UK Data Protection Act 1998. Any information you have given us will be used only to provide the service you have requested and will not be disclosed to organizations or people outside the TRAFFIC Network.

TRAFFIC NETWORK

TRAFFIC International
219c Huntingdon Road, Cambridge, CB3 0DL, UK
Tel: (44) 1223 277427; Fax: (44) 1223 277237; E-mail: traffic@trafficint.org

TRAFFIC East Asia
Regional Office Room 2001, Double Building, 22 Stanley Street, Central, Hong Kong
Tel: (852) 2 530 0587; Fax: (852) 2 530 0864; E-mail: tea@pccw.imsbiz.com

Japan Office 6th Floor, Nihonseimei Akabanebashi Bldg., 3-1-14, Shiba, Minato-ku, 105, Tokyo, Japan
Tel: (81) 3 3769 1716; Fax: (81) 3 3769 1304; E-mail: trafficj@twics.com

Taipei Office PO Box 7-476, Taipei, Taiwan
Tel: (886) 2 2362 9787; Fax: (886) 2 2362 9799; E-mail: treatai@ms1.hinet.net

TRAFFIC East/Southern Africa
Regional Office c/o WWF Southern Africa Regional Programme Office
PO Box CY 1409, Causeway, Harare, Zimbabwe
Tel: (263) 4 252533/252534; Fax: (263) 4 703902; E-mail: traffic@wwf.org.zw

Kenya Office PO Box 68200, Nairobi, Kenya
Tel/Fax: (254) 2 577943; E-mail: traffic@iconnect.co.ke

South Africa Office c/o Endangered Wildlife Trust, Private Bag x11, Parkview 2122, Johannesburg, South Africa
Tel: (27) 11 486 1102; Fax: (27) 11 486 1506; E-mail: trafficza@uskonet.com

Tanzania Office c/o WWF Programme Office, PO Box 106060, Dar es Salaam, Tanzania
Tel: (255) 22 2701676; Fax: (255) 22 2775535; E-mail: trafficz@raha.com

TRAFFIC Europe
Regional Office Bd. Emile Jacqmain 90, B-1000 Brussels, Belgium
Tel: (32) 2 343 8258; Fax: (32) 2 343 2565; E-mail: traffic@traffic-europe.com

Candidate Countries Office c/o WWF Hungary, Németvölgyi út 78/b, 1124 Budapest, Hungary. Tel: (36) 1 214 5554; Fax: (36) 1 212 9353; Email: attila.steiner@wwf.hu

France Office c/o WWF France, 188 rue de la Roquette, F-75011 Paris, France
Tel: (33) 1 55 25 84 84; Fax: (33) 1 55 25 84 74/85; E-mail: sringuet@wwf.fr

Germany Office c/o Umweltstiftung WWF Deutschland, Rebstöcker Str. 55, D 60326 Frankfurt, Germany
Tel: (49) 69 79144 180; Fax: (49) 69 617221; E-mail: melisch@wwf.de

Italy Office c/o WWF Italia, Via Po, 25/c, Rome 00198, Italy
Tel: (39) 06 84497357; Fax (39) 06 84497356; E-mail: traffic.italy@tiscalinet.it

Russia Office c/o WWF Russia Programme Office, PO Box 3, 109240 Moscow, Russia
Tel: (7) 095 727 09 39; Fax: (7) 095 727 09 38; E-mail: ashestakov@wwf.ru

Sweden Office c/o WWF Sweden, Ulriksdals Slott, S-17081 Solna, Sweden
Tel: (46) 8 624 7400; (46) 226 70050; Fax: (46) 8 85 1329; (46) 226 70022
E-mail: mforslund@wwf.se or fogelvak@algonet.se

TRAFFIC North America
Regional Office 1250 24th Street, NW, Washington, DC 20037, USA
Tel: (1) 202 293 4800; Fax: (1) 202 775 8287; E-mail: tna@wwfus.org

Canada Office c/o WWF Canada, 245 Eglinton Avenue East, Suite 410, Toronto, Ontario M4P 3J1, Canada
Tel: (1) 416 489 4567; Fax: (1) 416 489 3611; E-mail: traffic@wwfcanada.org

Mexico Office c/o WWF Mexico Programme Office
Ave. México No. 51, Col. Hipódromo Condesa, C.P. 06100 México, D.F., México
Tel: (525) 286 5631/34; Fax: (525) 286 5637; E-mail: areuterwwfmex@mexis.com

TRAFFIC Oceania
GPO Box 5 28, Sydney NSW 2001, Australia
Tel: (61) 2 9280 1671; Fax: (61) 2 9212 1794; E-mail: traffic@traffico.org

TRAFFIC South America
Av. Atahualpa 955 y República, Edificio Digicom 7mo. piso, PO Box 17-17-626, Quito, Ecuador
Tel: (593) 2 2261075 Ext 400; Fax: (593) 2 466624; E-mail: tsam@traffic.sur.iucn.org

TRAFFIC Southeast Asia
Regional Office Unit 9-3A, 3rd Floor, Jalan SS23/11, Taman SEA, 47400 Petaling Jaya, Selangor, Malaysia
Tel: (603) 7880 3940; Fax: (603) 7882 0171; E-mail: tsea@po.jaring.my

Indochina Office c/o WWF Indochina Programme Office, 53 Tran Phu Street, Ba Dinh District, International PO Box 151, Hanoi, Vietnam
Tel: (84) 4 733 8387/8386; Fax: (84) 4 822 0642; E-mail: jthomson@wwfvn.org.vn