

STUDY ON THE SOCIAL AND ECONOMIC ASPECTS OF ILLEGAL FISHING IN THE CASPIAN SEA

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Cover picture:

Beach south of Lenkoran (Southern coast of Azerbaijan, 40km from the Iranian border –map on page 23): Sturgeon fishing nets drying on the beach while fishermen prepare them for the fishing trip, tying together 5 to 7 m units of nets (TRAFFIC Europe / C. Raymakers, September 2001).

INTRODUCTION

One of the mandates of the Caspian Environment Programme (CEP), funded by the Global Environment Facility (GEF) and TACIS of the European Union, is to formulate a Transboundary Diagnosis Analysis (TDA). The TDA is a document that describes the environmental conditions and related issues throughout the Caspian Sea and its coastal area. It proposes a wide range of initiatives as well as adequate targets to be aimed at for each issue identified. The present study is a component of this analysis, focussing on fisheries, including related illegal activities and their socio-economic context.

In most instances it has been possible to draw close relationships between environment or nature conservation issues and socio-economic factors that arose in various regions around the world (Roe, 2001). Recent geo-political changes that occurred around the Caspian Sea, particularly in the Commonwealth of Independent States (CIS, former Soviet Union –or New, Independent States, NIS), destabilised regime in which most Caspian countries evolved since the mid 1980s and the subsequent poor socio-economic conditions in which the population was pulled are being considered. The aim of such assessment is to contribute in designing strategies that offer possible ways to reduce destructive impacts and damages of human activities on the environment.

The present document intends to provide useful data and information on socio-economic aspects of coastal communities, particularly of the fisheries sector in the Caspian Sea region. Due to the precarious situation of sturgeon in the Caspian Sea (De Meulenaer and Raymakers, 1996), focus was put on the sturgeon fishery and trade. International trade in caviar, legal provisions adopted by CITES (Convention on International Trade in Endangered Species of wild fauna and flora) to tackle uncontrolled exports and imports of illegally acquired (e.g. poached) sturgeon specimens, artificial breeding challenges and sturgeon aquaculture development in the world were included to integrate the Caspian Transboundary Diagnosis Analysis in a global context.

METHODOLOGY

Results presented below first describe the broader economic and legal scenes of Caspian sturgeon fisheries and trade in the world. The document therefore, starts with a view of the world caviar trade and domestic markets in sturgeon products in some Caspian countries. It then gives an overview of trade and fisheries control measures adopted at national level, some having been recommended internationally. The next chapter consists of the compilation and analysis of the outcome of national studies and coastal community surveys on social and economic aspects of legal and illegal Caspian fisheries with references to the country and community reports attached as annexes.

Trade data from CITES Parties annual reports and customs services data of main caviar importing nations were used to describe the trends of volumes and values of sturgeon products exchanged internationally from countries where the species occur.

Field surveys were carried-out to collect data and information on domestic markets (channels and retail prices). Official documents distributed by the CITES Secretariat (available on the website: www.cites.org) were used as reference to outlines measures adopted by CITES Parties and bodies, particularly the Animals and Standing committees, at their regular meetings.

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Due to limited funds and time, the study was restricted to three of the five Caspian range States and to one or two survey sites in coastal and riparian communities per country. The three countries studied and surveyed were selected based on three main parameters:

- their geographical location [covering the entire range of latitudes: north (Russian Federation –RU), middle (Azerbaijan –AZ) and south (Iran –IR)],
- their recent history [part of the CIS, the Commonwealth of Independent States (CIS, former Soviet Union –or New Independent States, NIS) (AZ and RU) or not (IR)] and
- their different fishery management and trade control regimes [in transition (AZ and RU): from a centralised Soviet structure, to a market-driven capitalistic system, and a stable geo-political situation where the fishery is State owned (monopoly) (IR)].

Coastal communities were chosen based on the importance of their fishery sector and on the occurrence (informal reports) of illegal fishing practices, whether performed occasionally by independent fishermen or organised in networks and possibly linked to broader connections. Although illegal sturgeon fishing is intensive in areas such as the Autonomous Republics of Dagestan and Kalmykia, it was decided that they would not be covered by the present study due to the high proportion of organised criminal activities linked to sturgeon poaching in these places and to risks for surveyors when performing interviews and afterwords. However, links with journalists allowed to report some information (Annex 17).

Detailed lists of questions and points to be covered (Annex 2) were prepared in consultation with each contact person selected to co-ordinate or undertake the surveys and/or study in the Caspian areas:

- Azerbaijan: Neftchala region on the Kura River delta-like estuary and the town of Nabran in the north of the country, close to the border with the Autonomous Republic of Dagestan (Russian Federation);
- Iran (Islamic Republic of): Bandar Anzali in the western province of Gilan (bordering Azerbaijan) and Fereidoon Kenar in the eastern province of Mazandaran (bordering Turkmenistan); and
- Russia: Astrakhan region, the heart of the Volga River delta.

RESULTS OF THE DESKTOP STUDY

The desktop study consisted in a compilation and analysis of data and information on sturgeon fisheries, trade and markets collected by TRAFFIC and experts in the last four years and during the present project.

Results presented cover,

1. an analysis of international trade in sturgeon and on domestic markets, for which data and information were collected during field investigations and studies on sturgeon products that shed light on legal and illegal trade (Annex 3 and 4 a-b); and
2. the recent history of measures adopted in the context of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) since the listing in Appendix II of sturgeon and paddlefish species not yet listed in 1997 (entry into effect on 1 April 1998) and the perspectives of proposals that might be submitted at the next meeting of the Conference of the Parties (CoP12) that are accompanied with a list, attached as Annex 5, of
 - a. Concrete actions to be promoted for sturgeon conservation as well as
 - b. Possible adverse effects of the reduction, or total prohibition, of international trade in sturgeon specimens, particularly from the Caspian Sea basin and other areas of occurrence, have been identified.
3. the implementation of CITES recommendations such as the list adopted in Resolution Conf. 10.12(Rev.) *Conservation of sturgeons*, Decision 11.58 regarding the establishment of export quotas by range States and progress made in the implementation and revision of Resolution Conf. 11.13 *Universal labelling system for the identification of caviar*.
4. figures and technical information on national restocking programmes undertaken by Caspian range States and recent changes in the output of some of them. Additional technical aspects on restocking programmes implemented in Azerbaijan (Annex 13) and Iran (Annex 8) are provided.
5. the development of sturgeon and paddlefish aquaculture (farming / captive breeding) in the world (Table 15 and Figure 2), including some of its challenges and risks.
6. an overview of existing legislation on sturgeon fisheries management and trade control measures adopted by Caspian Sea range States (Table 16 and Annexes 8 to 10).
 - c. An overview of measures in place in nine Eurasian sturgeon range States was compiled (Annex 8);
 - d. A detailed description of these measures is presented for two of the five Caspian States: Azerbaijan and the Russian Federation (Annexes 9 and 10).

International Trade in Caviar 1990 – 2000

The world's interest for the sturgeon fishery is driven by one of its products: caviar. The high value and exclusive image of this commodity can bring important direct (foreign currency income) and indirect (reputation of a country that may lead to "upper class tourism") profit to the exporting nations.

The global caviar trade is dominated by a few nations. Based on CITES Parties reports (Anon., 1999a and 2000a), in 1998, about 99% of the supply came from seven countries, with more than 90% originating from the Caspian Sea basin (the Russian Federation (121 tonnes, 44%), Iran (42%) and Kazakhstan (9%)). The 1999 world largest caviar suppliers were Iran (99 tonnes, 49%), the Russian Federation (26%) and Kazakhstan (13%). At the destination end, almost 100% of the caviar was imported into 12 countries, with 95% going to the European Union (EU), Japan, Switzerland (mostly for re-exports) and the USA (Anon., 2000c). In 1998, more than 50% of the trade was destined for the EU alone (France (19%) and Germany (17%)). In 1999, 49% of the caviar traded internationally was imported by the USA, 33% by the EU (15% by France and 8% by Germany) and 15% by Switzerland and was the world's largest importer (24%). CITES records for 1998 show that Stellate sturgeon (*Acipenser stellatus*) accounted for 47% of the caviar, followed by 32% consisting of Russian sturgeon (*A. gueldenstaedtii*) and by 10% of Beluga (*Huso huso*).

An investigation involving European, Japanese and US caviar importers, indicated that CITES listing of Acipenseriformes (sturgeon and paddlefish species), in effect since 1 April 1998, may have effectively improved international trade controls (Raymakers, 2000; Anon, 2000c) and probably reduced the volume of smuggled caviar. European caviar traders reported that the CITES listing of sturgeon and paddlefish improved international trade controls. The symptoms observed by the traders since 1998 included:

- (a) it has become easier to discriminate legal from illegal sturgeon and paddlefish products on the market, based on the presence or absence of CITES documents,
- (b) offers of caviar of dubious suppliers or of questionable origins have significantly decreased, and
- (c) there has been greater awareness about the conservation status of the species and the need for strict controls amongst suppliers, buyers and customs officials."

In addition to these points, the improved understanding of the international trade of sturgeon and paddlefish products at species level as well as source of specimens in trade, i.e. wild or captive bred, should be added as a major contribution to the basis for better management of the wild populations.

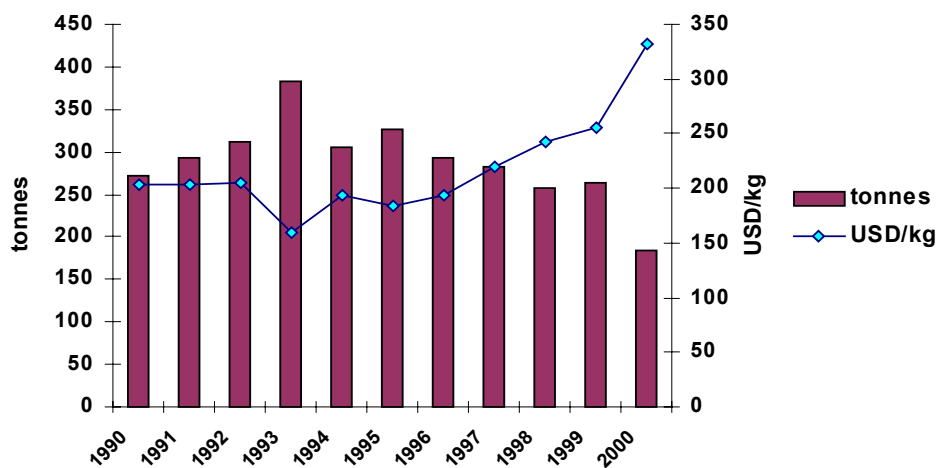
Based on data reported by customs services of major consuming nations, the EU (including re-exports from Switzerland), Japan and the USA, volumes of caviar imports declared at border controls had increased sharply in the early 1990s, accompanied by a drastic drop of their value that reached a minimum in 1993 (Table 1 and Figure 1). From 1995 to 2000, declared volumes of caviar imports decreased while the value increased. Such trends of world caviar trade seem to concur with the progressive recovery of controls that started in the mid 1990s and could subsequently be an indication of the reduction of low value sturgeon products of dubious sources smuggled to the largest caviar markets, EU Member States, Japan and the USA.

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Table 1 & Figure 1. World caviar imports into the EU, Japan and USA, 1990-2000

(Sources: Eurostat, Japanese Customs and US Department of Commerce)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
tonnes	272	293	311	383	305	326	294	283	257	263	184
USD/kg	203	204	205	160	193	184	194	219	242	255	332



Domestic Markets of Sturgeon Products in the Caspian States

According to the national legislation of most Caspian Sea range States, domestic trade in sturgeon products is extremely regulated. However, after a closer look, it seems that these regulations are not enforced. As a consequence, almost all products for sale on local markets do not comply with legal requirements and should be confiscated if efficient control took place.

Illegal trade in caviar and sturgeon meat in Moscow and Caspian

Despite the prohibition declared in 1993, caviar and sturgeon meat (frozen and smoked) were (from 1996 to 2000), and are still, displayed at numerous food stores in Moscow. In 1997, local traders reckoned that about 10 tonnes of sturgeon meat was brought to Moscow everyday (Annex 3). Based on TRAFFIC Europe's surveys since 1996, the most common symptoms of the dubious origin of caviar, e.g. caviar illegally acquired because extracted from poached sturgeon or illegally processed, were

1. **Forged documents:** In 80% of the sites explored the certificates for caviar sold in shops were obviously forged.
2. **Packaging:** Lids of illegal caviar tins and jars tended to imitate the products from famous producers (such as “*Russkaya Ikra*” (Russian Caviar) company). Others bore no information on the processing factory, or mentioned the “*Russian Ministry of Fishing Industry*” which does not exist. If the illegal caviar manufacturers tried to imitate products for export, flagrant English spelling and grammatical errors were found, e.g. “... *packed in the fishing factory* ...” printed on lids of jars sold in downtown Baku market, Tazer Bazar (Annex 4a & b).
3. **Conditioning:** Some outlets displayed caviar in bulk, which was sold by weight. This caviar was frequently sold with remains of the ovary sac, which is in direct contravention of current health requirements and reveals the illegal origin of the product.
4. **Retail prices:** The most obvious distinction between legal and illegal caviar was the price. Illegal caviar was so cheap that it was obvious that the value could not cover costs involved in running an official fishery operation (maintenance of the gear, fuel, etc.) and in processing the products in compliance with all sanitary requirements. Prices for illegal caviar were approximately two times lower than legal caviar. In 1999, prices of caviar sold illegally at Moscow markets ranged between 33 and USD 57.5/kg and the highest price for caviar sold in legal outlets, such as Moscow supermarkets, was USD 177/kg. The same product for sale in Moscow international airport duty free shops was labelled USD 858/kg.

Retail prices for caviar and sturgeon meat in range States

Regarding domestic trade, it seems that most Caspian range States (as well as Danube River/Sea of Azov/Black Sea range States) are unaware of the volume of sturgeon products consumed inside their borders. The Russian Federation for instance, specifically recognised that: “*The level of domestic consumption of sturgeon products in the Russian Federation is unknown, but is said to be the main outlet of illegal sturgeon fisheries...*” (Anon. 2001b). The knowledge on domestic trade is essential to ensure that the level of export quotas have no detrimental effect on wild sturgeon populations.

Caviar

Retail prices of different types of caviar, including Beluga, Ossetra and Sevruga, gathered in Azerbaijan, the Russian Federation (Moscow and Astrakhan, Volga River) and duty free shops in importing countries, from 1997 to 2002 are presented and summarised (Tables 1 to 22 in Annex 4a). The value of Beluga caviar is the highest, usually twice the value of Ossetra (most commonly from Russian or Persian Sturgeon *Acipenser persicus*) and three times the value of Sevruga (from Stellate Sturgeon).

Data collected also indicate that caviar retail prices,

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- Have decreased by 60% on Russian markets (USD 303 to 120/kg in 1997 and 1999 respectively);
- Have increased by 14% in duty free shops at Moscow international airport;
- Have increased by 44% in duty free shops in importing countries (USD 1,970 to 2,235/kg overall average prices recorded in 1999 and 2001 respectively);
- Were five times lower at the fish market than in shops in the Caspian region (Astrakhan); and
- Were three (USD 668/kg) to 96 times (USD 24/kg, Baku fish market, June 1997) lower in range States than the average price observed in duty free shops of importing countries (USD 2,315/kg).

Meat

Average retail prices in Azerbaijan and in the Russian Federation recorded in 1997, 1999 and 2000 were recorded and compiled (Annex 4b). The most expensive meat was smoked-dried sturgeon (“balyk”) sold at USD 9.8 to 11.8/kg. The value of frozen sturgeon meat ranged between USD 4.8 and 7/kg, while the price of the whole fish (frozen) ranged between USD 2 and 3.5/kg (Annex 4b).

The prices compiled suggest that,

- Paradoxically, since its caviar is the most priced, Beluga meat was the cheapest (USD 7.3/kg) regardless of the location and the time of the sale, about 66% of prices for Russian Sturgeon meat (USD 10.5/kg), which was the most expensive sturgeon meat;
- Retail prices for sturgeon meat in Moscow decreased by half between 1999 and 1997 (USD 8.37 and 16.75/kg respectively);
- Similarly to caviar, prices recorded in Moscow were higher (34% in 1999) than in the Caspian region (Astrakhan), USD 5.53/kg;
- Sturgeon meat sold on fish markets (USD 5.53/kg) was cheaper than in shops (USD 9.27/kg) or department stores (USD 13.88/kg), e.g. as low as 60% in Astrakhan in 1999; and

As for caviar, the cheapest prices for sturgeon meat were recorded on markets in Baku, USD 1.83/kg (June 1997).

The value of caviar in range States and importing countries (Annex 4 a & b)

Trends in prices are commonly used to assess the trends in supply and demand of a market. With regard to caviar, the fact that, from the mid- to the late 1990s, retail prices at Russian markets have decreased by half [USD 303/kg in 1997 (Annex 4a) to USD 140/kg in 2001 (TRAFFIC Europe field survey)] while retail prices for Russian caviar in import countries doubled [from USD 920/kg in retail shops in 1995 (excluding supermarkets and Beluga caviar)(De Meulenaer and Raymakers, 1996) to USD 2,290/kg in duty free shops in 2001 –Annex 4a]. These trends suggest that, with a constant demand, the supply could have increased in Russia and decreased in importing countries. Hypothetically, one could understand that, with the adoption of additional measures to control international trade in sturgeon and paddlefish in 1997 (i.e. CITES listing), smuggling of their products became more difficult (Raymakers, 2000; Anon., 2000c) and greater volumes of caviar had to be marketed domestically where the demand did not raise accordingly which caused prices to drop. Following this approach, the need to control domestic markets could be seen as the next priority. Similarly, retail prices of sturgeon meat in Russia and Azerbaijan decreased by half from 1997 (USD 16.75/kg) to 1999 (USD 8.37/kg) (Annex 4b). For meat, other factors should be mentioned such as the scarcity of adult fish causes the caviar productivity of the catch to diminish and interest in promoting the marketing of meat.

Additionally, average retail prices for caviar from wild sources from 1997 to 2001 were about six times lower in producing countries (AZ, IR and RU), USD 380/kg, than in importing countries (duty free shops in Germany, Switzerland and United-Kingdom), USD 2320/kg (Annex 4a). This important difference significantly undermines the economic benefit to be made from sturgeon fishery by range States. One among other possible reasons for such low prices and the subsequent economic loss for the fishing industry of Caspian nations is the illegal, unregulated and unreported nature of their fishery and trade.

Implementation of CITES provisions regarding caviar export quotas

A brief history of conservation of Acipensériformes (25 species of sturgeon and 2 paddlefish) since the inclusion of the 23 species that were not yet covered by CITES provisions, is provided in Annex I.

Most Caspian range States adopted strict domestic trade regulations to control sturgeon fisheries and the marketing of sturgeon products in the region, but these countries recognised that, for almost one decade, trade in caviar was no longer under efficient control and additional measures were needed. Export quotas for caviar and sturgeon meat have been established since 1998 (Table 2 and 3) following the recommendation made by CITES Parties.

The total caviar export quota set by Caspian Sea range States was reduced by 33% in four years, from 1998 to 2001 (Table 2), but these self-imposed limits do not integrate illegal exports that have been reported to be particularly high in the northern Caspian. For 2001, Iran set the highest export quotas, its share then reached 54% of the overall Caspian predicted exported. 2002 export quotas for sturgeon and paddlefish should be submitted to the CITES Secretariat by all Parties that want to trade in their products before 1 January 2002.

For 2001, the highest quotas were allocated for the export of Stellate sturgeon products, 37.5% of the caviar and 33.2% of the meat (Table 3), while for Russian sturgeon exports represented 19.6% and 21.7% for caviar and meat respectively, and for Beluga 8.8% and 21.1%.

Bases for calculation of export quotas, Case study: caviar production in Russia

Questions arose regarding the bases used by range States for setting their export quotas. To date it has not been possible to verify the data and information on which the establishment of 1998 to 2001 export quotas was founded.

The most important gaps include,

- insufficient update on scientific data on population status and
- unknown levels of domestic consumption.

But additional aspects have attracted the attention of experts, such as

- rates of caviar used to estimate the national annual production from the total sturgeon catch
- relevance of using restocking efforts in the calculation of catch quotas from which export quotas derive and
- levels of by-catch.

Therefore, concerns raised reside with a variety of aspects ranging from the lack of information on quantities consumed locally and the absence of control of domestic trade to export quotas that, after verification, seem too high compared to official sturgeon catch records.

Examples presented hereunder illustrate the type of questions that appear when trying to understand the mechanism of export quota settings applied by certain range States.

Rates of caviar extracted from the total sturgeon catch

To estimate the volume of caviar to be extracted from the total sturgeon catch, including females, males and immature fish that were landed, a rate of 7.5% in weight is most commonly used and agreed by most scientists for wild sturgeon populations. However, based on official catch and export data (Annex 6), the rates of caviar exported from the total catch in 1998 and 1999 appear to be much higher for Iran (13.4%) and the Russian Federation (11%). This may suggest, either that fishing quotas were exceeded, or that a higher proportion of females were caught to realise the export quotas adopted for those years.

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Table 2. CITES Export Quotas for sturgeon species in the Caspian Sea (kg)
(Source: Anon. 1998a, 1999b, 2000b and 2001a)

(kilogram)	1998	1999		2000		2001		
	caviar	caviar	meat	caviar	meat	fertilised eggs	caviar	meat
Azerbaijan (AZ)								
<i>A. gueldenstaedtii</i> ¹		5.900	50.000	3.750	30.000		3.450	
<i>A. stellatus</i>		3.800	38.000	2.750	22.000		2.840	
<i>H. huso</i>		434	13.000	1.000	8.000		520	
Sub-total caviar and meat AZ		10.134	101.000	7.500	60.000		6.810	
Iran³ (IR)								
	110.000							
<i>A. gueldenstaedtii</i>	10.000	14.000		(see <i>A. persicus</i>)			3.460	11.000
<i>A. nudiventris</i>							1.000	
<i>A. persicus</i>	45.000	53.000		52.000 (both <i>A. persicus</i>			51.000	140.000
<i>A. stellatus</i>	50.000	40.000		35.000		and <i>A. gueld.</i>)	23.400	50.000
<i>H. huso</i>	5.000	3.000		3.000			3.950	75.000
Sub-total caviar and meat IR		110.000		90.000			82.810	276.000
Kazakhstan (KZ)								
<i>A. gueldenstaedtii</i>		5.500		7.700			3.200	20.900
<i>A. nudiventris</i>		1.500		5.600			2.500	14.350
<i>A. stellatus</i>		24.000		14.800			20.900	83.230
<i>H. huso</i>		6.000		8.300			4.200	27.900
Sub-total caviar and meat KZ		37.000		36.400			30.800	146.380
Russian Federation (RU)								
<i>A. baerii</i>	19.000	2.000		400		30		
<i>A. gueldenstaedtii</i> (Caspian)	69.000	40.000		25.090	75.000	60	26.300	93.000
<i>A. gueldenstaedtii</i> (Azov)				8.500	17.000		2.000	17.000
<i>A. ruthenus</i>				300	2.000	5	100	
<i>A. schrencki</i>	1.700	1.500		2.000	4.000		2.140	4.000
<i>A. stellatus</i> (Caspian)	85.000	42.000		28.350	72.000		25.000	76.000
<i>A. stellatus</i> (Azov)				11.000	16.000		2.500	17.000
<i>H. dauricus</i>	3.600	3.500		6.000	18.000		7.000	20.000
<i>H. huso</i>	5.000	3.000		3.500	13.000		3.800	14.000
<i>A. baerii</i> x <i>A. gueldenstaedtii</i>							10	
<i>A. baerii</i> x <i>A. ruthenus</i>							15	
<i>A. gueldenstaedtii</i> x <i>A. baerii</i>							70	
<i>A. gueldenstaedtii</i> x <i>A. ruthenus</i>							15	
<i>H. huso</i> x <i>A. ruthenus</i>							90	
<i>Polyodon spathula</i>							5	
Sub-total RU	183.300	92.000		85.140	217.000	300	68.840	241.000
Turkmenistan (TK)								
Sub-total Caspian Sea (exc. IR)	159.000	132.134	101.000	120.640	255.000	270	97.310	363.380
Sub-total Caspian Sea	269.000	242.134	101.000	210.640	255.000	270	180.120	639.380
Sub-total Amur River	14.070	10.940	0	13.940	22.000	0	15.080	24.000
TOTAL	315.070	262.574	111.000	234.580	355.000	300	205.600	974.480

¹ In 1999, 50.000 kg for both meat and live specimens.

² In 1999, caviar only in labelled tins.

³ No official quotas given in 1998 - figures presented are estimates from informal communications.

Table 3. Summary of export quotas per species (kg)

(Source: Anon. 1998a, 1999b, 2000b and 2001a)

Common and (Scientific) names		1998	1999	2000	2001
Siberian sturgeon (<i>A. baerii</i>)	caviar	19,000	2,000	400	
Lake sturgeon	caviar				500
(<i>A. fulvescens</i>)	meat				170 000
Russian sturgeon	caviar	79,100	66,720	60,840	40,210
(<i>A. gueldenstaedtii</i>)	meat		53,500	142,000	161,000
Ship sturgeon	caviar		1,500	5,600	3,500
(<i>A. nudiiventris</i>)	meat				14,350
Atlantic sturgeon	caviar				500
(<i>A. oxyrinchus</i>)	meat				58 000
Persian sturgeon	caviar	45,000	53,000	38,000	51,000
(<i>A. persicus</i>)	meat				140,000
Sterlet	caviar		30	300	100
(<i>A. ruthenus</i>)	meat			2,000	
Amur sturgeon	caviar	5,483	4,010	4,510	4,650
(<i>A. schrencki</i>)	meat			4,000	4,000
Stellate sturgeon	caviar	135,000	111,800	94,000	76,690
(<i>A. stellatus</i>)	meat		42,000	133,000	247,230
Kaluga	caviar	8,587	6,930	9,430	10,430
(<i>H. dauricus</i>)	meat			18,000	20,000
Beluga	caviar	12,900	16,584	21,500	18,020
(<i>H. huso</i>)	meat		15,500	56,000	156,900
	Total caviar	305,070	262,574	234,580	205,600
	meat	0	111,000	355,000	974,480

Inconsistency between catch and export quotas and assumption of no domestic consumption

Using a rate of caviar of 7.5% (see above) in weight of the total sturgeon catch in the Russian Federation, the estimated volume of caviar produced in 1998 is 101,220kg (Table 4). Of which 20 to 25% is used for scientific purpose and sturgeon hatcheries. The remaining quantity (75 to 80%) destined to commercial trade is therefore estimated at 78,450kg caviar for 1998 in the Russian Federation. However, the caviar export quota set by the Russian Federation for 1998 is 83,000kg (after deducting the estimated share of Azerbaijan and Kazakhstan, 12 and 43% respectively). It thereby exceeded by 6% the estimated volume available for commercial trade. In calculating the 1998 caviar export quota, the Russian authorities considered that all the caviar available for commercial trade was exported and that the domestic market did not exist. They obviously did not take into account the large quantities of caviar openly, and most often illegally, sold in Moscow and other Russian cities.

Table 4. Legal caviar production and exports from Russia, 1995 to 1998 (kg)

(Source: State Committee for Fisheries, CITES Notification N°1998/61, 1998 Annual Report and Russian Custom services.)

(kg)	1995	1996	1997	1998
Legal caviar production	203,280	127,617	121,786	101,220
Caviar available for trade (75%)	157,540	98,900	94,385	78,450
Export Quota (CITES)¹				183,300
Exports, CITES Annual Reports				47,327

¹ Including the share of Azerbaijan and Kazakhstan.

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The same remark can be made for the year 2000, when the catch quota was set at 783 tonnes, from which an estimated volume of 58 725 kg (7.5%) of caviar could theoretically be produced. Estimating that about 45 500 kg (77.5%) were available for commercial trade after deducting the average 22.5% destined to scientific activities. However, the total caviar export quota submitted by the Russian Federation to the CITES Parties for 2000 was about 85,000 kg, 46% higher than the estimated volume of caviar legally available.

By-catch of sturgeon by Caspian Sea fisheries targeting other species of fish

Limited data were provided about by-catch of sturgeon by other Caspian fisheries, for instance kilka fishing. However, available figures (based on the 364 fish reported as by-catch in 1992, the estimated total number of sturgeon (all species) caught as by-catch was: 1500 fish; Table 5) suggest that levels of sturgeon by-catch can be significant enough to affect the status of wild populations. Also, species recorded in the by-catch include taxa that are particularly endangered, such as Ship sturgeon, *A. nudiventris*.

Nevertheless, there is not clear indication from range States that mechanisms have been set-up to record and control the level of sturgeons caught in gears of other fisheries and that it is taken into consideration when deciding upon fishing management measures such as planning of Total Allowable Catch (TAC).

Table 5. Species composition of the total catch in Azerbaijan in the 1990s

(Source: CITES Management Authority of Azerbaijan, in litt. to TRAFFIC Europe, September 2000)

	<i>A. persicus</i>	<i>A. gueldenstaedtii</i>	<i>A. stellatus</i>	<i>Huso huso</i>	<i>A. nudiventris</i>
Catch	30.8%	32.7%	30.77%		5.76%
By-catch	54.2%	(about 364 fish) 24.3%	16.80%	3.70%	1%

Table 6. Annual recorded landings (catch and by-catch) of sturgeon in Azerbaijan (tonnes)

(Source: CITES Management Authority of Azerbaijan, in litt. to TRAFFIC Europe, September 2000)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>A. gueld. & A. pers.</i>	26.00	40.20	37.00	72.60	100.30	101.20	51.30	79.20	48.60	55.00	40.35
<i>A. stellatus</i>	20.00	27.00	25.00	92.00	67.60	31.80	44.80	27.10	20.70	33.50	20.76
<i>Huso huso</i>	27.00	21.00	49.00	74.60	33.30	29.50	24.10	22.30	13.10	20.00	21.11
<i>A. nudiventris</i>	1.00	0.00	0.00	0.90	0.00	0.00	0.10	0.00	0.00	0.40	0.00
Total	74.00	88.20	111.00	240.10	201.20	162.50	120.30	128.60	82.40	108.90	63.25

National sturgeon restocking programmes in the Caspian Sea

Taking into consideration the number of sturgeon fingerlings released is not a sufficient criteria to assess the effective level of restocking. Indeed, the size of these fingerlings (weight – length) at the time of release is an important parameter to consider because smaller fish will be more vulnerable to predation and thereby suffer higher mortality rates. Therefore, the recent increase in number of sturgeon specimens released in Azerbaijan (Table 7) does not give a realistic picture of the country’s restocking efforts because the 20 million post-larva or fry released in 1999 were less than 10 days old, not big enough to be called fingerlings (Annex 13). The reason for their early release is that obsolete and damaged facilities as well as lack of funds no longer allow the hatcheries in Azerbaijan to feed the offspring that must therefore be released as soon as their yolk-sac is resorbed (between 4 and 7 days after hatching).

Scientists however tend to agree that, when fingerlings are released too early (smaller size juvenile sturgeon), the chances of survival of these fish are significantly reduced (Arlati *et al.*, 1999) and the restocking strategy has been adjusted in most countries of the Caspian Sea as well as in other areas of distribution of sturgeon such as the lower Danube River. In Iran (Table 8 and Annex 7) for instance, technical staff suggested that every gram added to the weight of fingerlings released increases the survival rate by 1%. In Russia (Table 10 and Addendum to Annex 17), the size of fingerlings at the time of release has been increased to about 15g. Finally in Bulgaria a low number of large size fingerlings is released, i.e. less than 30,000 individuals/year, but all are grown to at least 25g (Anon. 2000d).

Table 7. Estimated numbers of sturgeon fingerlings and fry released by three hatcheries in Azerbaijan (million fingerlings)
(Source: CITES Management Authority of Azerbaijan, *in litt.* to TRAFFIC Europe, 18 September 2000)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
<i>A. gueldenstaedtii</i>	13.370	5.330	2.130	1.230	0.750	0.940	3.030	3.770	4.490	10.186	8.869
<i>A. stellatus</i>	3.747	2.870	0.400	0.608	0.392	0.302	1.040	2.100	1.320	8.822	6.869
<i>H. huso</i>	0.406	0.144	0.450	0	0	0	0	0.072	0	0.162	0.357
Total	<i>17.523</i>	<i>9.082</i>	<i>2.980</i>	<i>1.838</i>	<i>1.142</i>	<i>1.242</i>	<i>4.070</i>	<i>6.065</i>	<i>6.220</i>	<i>20.290</i>	<i>16.965</i>

Table 8. Sturgeon fingerlings release annually in Iran (million fingerlings)
(Source: CITES Management Authority of Iran, *in litt.* to TRAFFIC Europe, 24 September 2000)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
<i>A. persicus</i>	4.06	5.92	2.93	3.57	4.66	8.05	11.02	18.75	22.59	17.30
<i>A. gueldenstaedtii</i>		0.04			0.30	0.52	0.67	0.92	0.42	0.96
<i>A. stellatus</i>	0.36	0.47	0.07	0.30	0.46	0.27	0.22	0.29	0.18	0.13
<i>H. huso</i>	0.14	0.17	0.45	0.30	0.49	0.29	0.34	1.44	0.69	0.41
Total	<i>4.56</i>	<i>6.60</i>	<i>3.45</i>	<i>4.17</i>	<i>5.91</i>	<i>9.13</i>	<i>12.35</i>	<i>21.63</i>	<i>24.56</i>	<i>19.10</i>

Table 9. Annual release of sturgeon fingerlings in Kazakhstan (number of fingerlings)
(Source: CITES Management Authority of Kazakhstan, *in litt.* to TRAFFIC Europe, 21 September 2000)

	1998	1999	2000
<i>A. gueldenstaedtii</i>	647,200	1,492,800	1,266,300
<i>A. stellatus</i>	1,058,993	2,581,005	3,771,060
<i>H. huso</i>		515,666	192,000
Total	<i>1,706,193</i>	<i>5,318,471</i>	<i>5,507,160</i>

Table 10. Former USSR and Russia sturgeon fingerlings release in the Volga River and the Sea of Azov (n° of fingerlings) (Source: Azov and Caspian Fisheries Scientific Research Institute (Az- and KaspNIRKh), cited in Anon., 2000d)

	1979-1980	1981-1985	1986-1990	1991-1995	1996-1998
Volga River <i>A. gueldenstaedtii</i>	25,000,000	35,000,000	40,800,000	42,000,000	28,000,000
<i>A. stellatus</i>	16,400,000	19,400,000	16,200,000	10,100,000	15,500,000
<i>Huso huso</i>	15,000,000	18,300,000	13,000,000	8,500,000	12,000,000
Total Volga-Caspian	<i>56,400,000</i>	<i>72,700,000</i>	<i>70,000,000</i>	<i>60,600,000</i>	<i>55,500,000</i>
Sea of Azov <i>A. stellatus</i>	18,950,000	19,120,000	73,800,000	13,040,000	14,293,103
<i>A. gueldenstaedtii</i>	22,050,000	15,360,000	67,300,000	13,800,000	18,233,333
<i>Huso huso</i>	2,000,000	222,800	377,000	27,200	404,218
Total Sea of Azov	43,000,000	34,702,800	141,477,000	26,867,200	16,520,654

Sturgeon broodstock used in recent years (number of females and males)

Since the construction of large dams on the tributaries, particularly the Volgograd dam on the Volga (Russian Federation) and the Mingechaur dam on the Kura River (Azerbaijan) (Annex 13), more than 90% of the spawning grounds are no longer accessible to mature sturgeon that are blocked during their migration. Authorities responsible for the management of sturgeon fisheries have developed artificial breeding programmes to compensate for the loss of annual recruitment and attempt to maintain the population status of the most important commercial species of sturgeon. For Stellate sturgeon the artificial reproduction has proved to be less successful (tables below).

To perform artificial reproduction in a closed environment, mature females and males are caught, their spawning artificially induced by hormonal injection and ova and sperm are collected. The latter, collection of “seed” (reproduction material) is delicate and, until recently (1997), ended with the death of the adult fish. Under the current circumstances, the scarcity of large mature sturgeon it is important to assess the need of broodstock to conduct sound sturgeon population enhancement programmes.

The following tables show that figures vary widely. But, as mentioned in the previous section, in the case of Azerbaijan individuals released were much younger (post-larval stage) and will suffer high mortality rates after their release. In the Russian Federation, where some hatcheries are still run with sufficient funds, young sturgeon are bred for 6 to 8 weeks and are released at a size of 15, 30 or 100g (15 weeks).

Taking into consideration, figures reported by the Russian hatchery for the year 2000, in average more than 100 adult females and males are need for each million sturgeon released. Based on Caspian States data for 1999, the estimate number of juvenile released in the Caspian Sea basin was 100 million. This level would imply the need for 10,000 adult female and males.

The development of efficient broodstock rearing programmes to prevent systematic/annual extraction of mature fish from the wild. Such programmes include the understanding of their nutrition, required environment conditions and identification of gene pool, is imperative to ensure that such programmes are sustainable (minimum catch of mature fish from the wild) biologically sound (preserve the species genetic diversity and prevent erosion of gene pool).

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Russia Federation

Table 11. Broodstock needed and number of fingerlings released in the *Krysanski* hatchery (Volga River delta, Southeast of Astrakhan, Russia) in 2000 (No. of fish)

	Females	Males	No. fingerlings produced (15 – 30g fingerling, 6 – 8 weeks)
Beluga	18	27	1.8 million
Russian sturgeon	147	147	5.3 million
Stellate sturgeon	201	201	1 million
TOTAL	456	375	8.1 million fingerlings

Azerbaijan

1. Banka hatchery (Kura River estuary, south Azerbaijan): The Deputy Director is Mr Jablaz HASHIMOV.

Table 12. Broodstock needed and number of fry released in the *Banka* in 2001 (No. of fish)

	Females	Males	No. fingerlings and “post-larvae” produced (1.5 g fingerlingss)
Russia sturgeon	12	14	?
Stellate sturgeon	38	38	?
TOTAL	50	52	4.5 million fry (post-larvae)

2. Hatchery at “*Mayag*” (light house) (Kura River estuary, south Azerbaijan): The director provided some information on his income and the history of the facilities. His salary in 2001 was USD 12 per month. Originally 360 concrete tanks were constructed, but only 100 were still operational at the time of the visit. The remaining 260 had been damaged due to land erosion caused by sea water level rise. During the spring artificial breeding season the hatchery employs 35 staff members.

Table 13. Broodstock needed and fry released in the *Mayag* (lighthouse) hatchery in 2001 (No. of fish)

	Females	Males	No. fingerlings and “post-larvae” produced (1.5 g fingerlingss)
Beluga*	1	1	?
Ship sturgeon*	1	1	?
Russian sturgeon	15	15	?
Stellate sturgeon	23	12	?
TOTAL	40	29	7 million fry (post-larvae)

* *Low level of broodstock could be a critical level to ensure genetic variability of the population.*

3. Two hatcheries in Azerbaijan in 1999 (ref. previous paragraphs & Annex 13 and Kazimov *et al.* 2001)

Table 14. Broodstock needed and fry released in two hatcheries (not named) in 2001 (No. of fish)

	Females	Males	No. fingerlings and “post-larvae” produced (1.5g fingerlingss)
Beluga*	1	1	?
Ship sturgeon*	4	3	?
Russian sturgeon	48	29	?
Stellate sturgeo	84	45	?
TOTAL	137	80	17.5 million fingerlings / post-larvae

* *Low level of broodstock could be a critical level to ensure genetic variability of the population.*

Hatcheries challenges and possible successful future development in the context of free trade

Until the late 1997 (Addendum to Annex 17), Caspian restocking programmes sacrificed the broodstock when artificial reproduction was performed. The scarcity of adults now requires that all specimens are kept alive and should, as in commercial fish farming, be fed adequately in order to provide for seed every 3 to 4 years. Preserving genetic diversity of the population of one species should be the main priority in order to avoid inbreeding. Both in Iran and in the Russian Federation, hatcheries have started developing a programme of rearing broodstock in ponds.

Currently the only monitoring programme of sturgeon juvenile release is carried-out in Iran where their migration and survival rates are studied, as well as the assessment of the site of release (distance to estuary)(Annex 7). Such post-release research projects are needed to improve the effectiveness of restocking programme, i.e. increase survival rates.

Obviously, until now without constant financial support from the central authorities hatcheries in the former Soviet Union could not operate. However, the new economical regime allows for the development of new economic systems, e.g. marketing (including export) of sturgeon fingerlings (Mason, 2001).

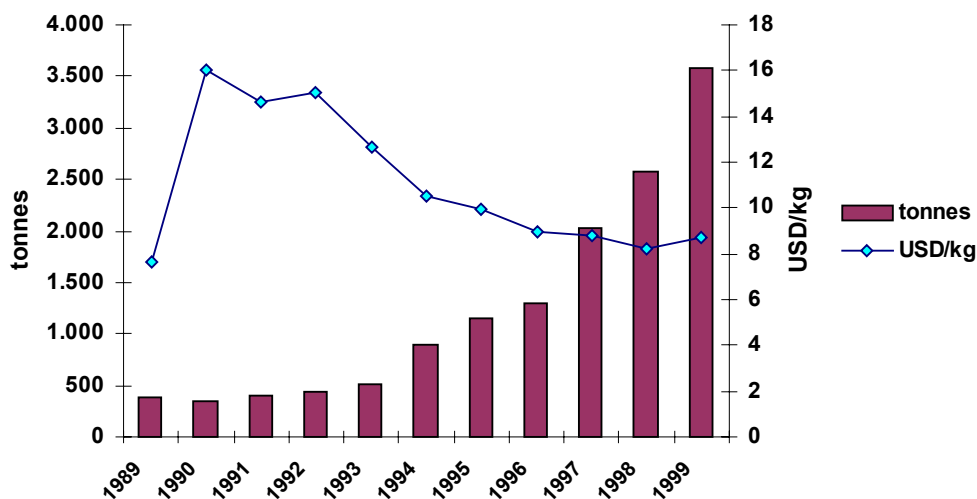
Aquaculture/Captive breeding/Farming of sturgeon and paddlefish 1989 – 1999

The world farming of sturgeon and paddlefish has developed rapidly in the past decade. FAO data (based on governments’ official records) (Anon. 2001c) suggest that the production may have multiplied by ten in ten years (Table 15 and Figure 2). However, the probability is high that real figures are significantly higher because nations that are known to produce important volumes of sturgeon in aquaculture do not report their results on fish farming to FAO. China for instance may have produced an estimated total of more than 2500 tonnes of sturgeon in 2001 (Qiwei Wei, *in litt.* to the IUCN/Species Survival Commission Sturgeon Specialist Group). Meanwhile, the commercial value of sturgeon products, as reported by national government agencies to FAO, seems to have dropped by half, indicating that marketing efforts may still be needed for sturgeon meat to promote its sale and increase consumers’ demand.

Under CITES provisions, products of “captive bred” (e.g. farmed) sources are treated differently, the procedure is eased and the issuance of the permit is not submitted to the necessary non-detriment finding that is applied to specimens from the wild. Therefore, to ensure that products illegally acquired from the wild are not “laundered” and exported as farmed ones, it is important that an identification protocol is set-up and is linked to a standardised labelling system that allows to trace the origin of the products.

Table 15 and Figure 2. World aquaculture of sturgeon and paddlefish (Source: FAO Fishstat, 2001)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
USD 1000	2.941	5.547	5.900	6.726	6.360	9.389	11.361	11.658	17.924	20.081	31.225
tonnes	384	346	403	446	503	895	1.142	1.304	2.032	2.576	3.582
USD/kg	7,66	16,03	14,64	15,08	12,64	10,49	9,95	8,94	8,82	8,20	8,72



As in all economical sectors, progress made in aquaculture development aim at cost reduction and increased technological efficiency.

Poly-culture (two or three species of fish bred simultaneously in the same ponds) seems to have multiple advantages. Successful trials were made in Russia, involving a Caspian species of sturgeon, e.g. *A. gueldenstaedtii*, and American paddlefish *Polyodon spathula* as herbivorous species. However the latter implies the introduction of an exotic species of fish that represents potential environment risks (see Recommendations).

Overview of Sturgeon Fisheries and Trade Control Legislation in the Caspian Sea and room for improvement (Table 16 and Annex 7 to 10)

Caspian states have adopted strict regulations to manage the sturgeon fishery and the trade in their products. These regulations include among others: the need for a fishing license accompanied with a catch quota for each license, limited fishing seasons, limited sizes of fish caught according to the species and prohibition to fish in certain areas (e.g. the open sea in Russia). However, concerns arose from the fact that, for more than a decade, most countries have been facing important problems with regard to the enforcement of their legislation.

Fisheries management regulations (Table 16)

Governments of Azerbaijan (Annex 9), Iran (Annex 7) and the Russian Federation (Annex 10) have adopted regulations to limit sturgeon fisheries and structures are theoretically in place to allow the control of the processing and the trade of sturgeon products. However, besides reports from numerous unofficial as well as official sources regarding the inefficiency of enforcement measures, biological information also seems to suggest that the current regulations might not adequately prevent the overexploitation of wild populations of sturgeon species. The following questions may be worse considering,

- Minimum size: 90 – 110 cm for *Acipenser stellatus*,
 86 – 105 cm for *A. gueldenstaedtii* and
 165 – 180 cm for *Huso huso*

However, scientific publications report that the average size of adult *A. stellatus* is 130–150 cm and that the average sizes at first spawning for the two other species are 120 cm and 200 cm respectively. This seems to indicate that the fish that are caught legally will include specimens that did not have the opportunity to spawn even once.

- Fishing season: the open season in the Russian part of the Caspian Sea basin covers the entire migrating season of sturgeon.
- Fishing grounds: in the Russian part of the Caspian basin, the legal catch is restricted to the Volga Delta and upstream, without leaving one passage to allow for a certain number of adults to escape, complete their migration and breed.

Most sturgeon fishing regulations (Table 16) should be revised taking into account the biological characteristics of each species that have been studied for more than one century.

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Table 16.
Summary of Fisheries Management and Trade Control Measures for *Acipenser gueldenstaedtii*, *A. stellatus* and *Huso huso* (Raymakers, 2001a)

Biological parameters (for comparison with sturgeon fishing limitation (see columns "Minimum size (cm)"):

<i>Huso huso</i>	Age of sexual maturity: 10-16 years by males and 14-20 by females (Hochleithner and Gessner, 1999). Average size at first spawning: 2 m and 50 kg (Hochleithner and Gessner, 1999).
<i>Acipenser gueldenstaedtii</i>	Age of sexual maturity: 8-10 years by males and 10-16 by females (Hochleithner and Gessner, 1999). Average size at first spawning: 1.2 m and 9 kg (Hochleithner and Gessner, 1999).
<i>A. stellatus</i>	The spawning population is composed of 10-14-year old fish (Levin, 1997). Average size of spawners caught: 1.3 m and 6-7 kg for males and 1.5 m and 11-12 kg for females (Levin, 1997).

	Sturgeon Fishing Limitations					Minimum size (cm)		Illegal activities ¹	Total catch quota (tonnes)	Total export quota (tonnes)	Catch monitoring	
	Grounds	Open season(s)	Gear	License		Riv.	Coast				sex ratio	size
Azerbaijan	not in the open sea	All year around except in May	defined (beach seine)	required (only since 2000)	<i>Huso huso</i>	165	180	poaching/ illegal domestic trade/ smuggling	In 1998: ?	In 99, caviar 10.14 meat 101 In 2000, caviar: 7.5 meat: 60 In 2001, caviar: 6.8	no rule	none
					<i>A. gueldenstaedtii</i>	105	?		In 1999: ?			
					<i>A. stellatus</i>	90	110		In 2000: 65.6			
Iran²	restricted to few stations	Spring	defined (large mesh size gillnet)	required	<i>Huso huso</i>	?	?	?	data not available	In 98, caviar: 100 In 99, caviar: 110 In 2000, caviar: 90 In 2001, caviar: 82.8 meat: 276	yes	yes
					<i>A. gueldenstaedtii</i>	?	?					
					<i>A. stellatus</i>	?	?					
Kazakhstan	not in the open sea	Two seasons: spring and autumn	defined (beach seine)	required	<i>Huso huso</i>	180	?	?	In 1998: 520	In 99, caviar: 37 In 2000, caviar: 36.4 meat: 0 In 2001, caviar: 30.8 meat: 146.4	no rule	none
					<i>A. gueldenstaedtii</i>	105	?		In 1999: 355			
					<i>A. stellatus</i>	110	?		In 2000: 326			
Russian Fed.	not in the open sea	Two seasons: from ice melting to 5 June, and from 1 September to ice formation	defined (beach seine)	required	<i>Huso huso</i>	165	180	poaching/ illegal domestic trade/ smuggling	data not available	In 98, caviar: 183.3 In 99, caviar: 92 In 2000, caviar: 85.1 meat: 217 In 2001, caviar: 68.8 meat: 241	no rule	none
					<i>A. gueldenstaedtii</i>	86	105					
					<i>A. stellatus</i>	90	110					
Turkmenistan	not in the open sea	?	defined (beach seine)	state monopoly		(*)	(*)		(*)	none	(*)	(*)

(* The sturgeon catch quota is not extracted from the national territorial waters of Turkmenistan but rather in the Russian and Kazakh waters, in compliance with these countries legislation)

¹ Grey literature

² Iran in 2000: spring catch only.

Smuggling and international routes of illegal trade in Caspian sturgeon

Updated and complementary information on routes and means of distribution of sturgeon products from dubious Caspian sources (i.e. sturgeon poaching) was meant to be gathered during the surveys carried-out under the present project. However, the subject appeared far too sensitive and, at all selected sites, interviewees refused to provide details about buyers of poached sturgeon products: from where they came from, how the goods were transported, where they would transit and what was their final destination.

The desk top study of the project had to compensate for obstacles encountered in the field and a review of past and current field observations and grey literature gave the indications presented hereunder. Overall and surprisingly, the main trunk roads on which smuggled products are channelled out of their country of origin seem to remain rather constant over the years (1997 to 2001). Although it is evident that details, such as streets or houses used to store the merchandise or hiding techniques are changed regularly to avoid being discovered, this characteristic of relative constancy should help the countries of destination. The latter ought to set-up control systems that concentrate efforts on key points and stakeholders.

The main routes identified and observed by investigators, journalists, traders, tourists, etc. between 1997 and 2001 are,

From Azerbaijan

1. By air or surface (car and truck) to Turkey, where tourists purchase small quantities and from where large quantities are exported to western countries, particularly the United States in 1997 (Raymakers 1999).
2. By surface to Georgia (car, truck and train) where large quantities of sturgeon meat are sold on the market in Tbilisi (TRAFFIC Europe field investigations, summer 1997)

From Iran

1. By surface (car, truck and small boat) to the United Arab Emirates, particularly Dubai where caviar is most often for sale at the airport duty free shops (De Meulenaer and Raymakers 1996 and October 2001 special television documentary on the economy of small islands in the Persian Gulf) or
2. By surface (car and truck) to Azerbaijan, and from there to Turkey (see above)

From the Russian Federation

1. By surface (train, car and truck) via Moscow (Annex 4), Ukraine and Belarus to Eastern Europe, mostly Poland.
2. By surface (train, car, truck and commercial ship) via Moscow to St Petersburg from where it is shipped to large harbours in Western Europe, e.g. Antwerp (TRAFFIC Europe, field investigation at Christmas 1999) and Rotterdam.

RESULTS OF NATIONAL STUDIES AND COASTAL FIELD SURVEYS

To assess the importance of sturgeon fisheries in a socio-economic context, studies were undertaken on the national legislation, trade and the overall socio-economic situation of the country in Azerbaijan (Baku), Iran and the Russian Federation (Moscow and Astrakhan where fisheries data are available). Similar assessment were made at community or regional levels, therefore data on socio-economic changes that occurred in coastal areas of the three selected countries were collected through surveys based mostly on interviews with local authorities, enforcement officers, fishermen, their relatives and other relevant stakeholders in coastal villages.

Selected countries, sites and contacts/partners (maps on next pages)

AZERBAIJAN (AZ)

<u>Consultants</u>	<u>Sites</u>
Mr Telman Zeynalov	Based in Baku Neftchala and Lenkoran
Mr Adil Orujov	Nabran

I. National level study in Azerbaijan (Annex 11)

II. Community level surveys in south and north Azerbaijan

Sites selected for the Caspian coastal community surveys:

North Azerbaijan: **Nabran** (close to the border with Dagestan –RU) (Annex 12)

South Azerbaijan: **Neftchala** (Kura River estuary) and **Lenkoran** (Annex 13)

IRAN (IR)

<u>Consultants</u>	<u>Location</u>
Ms. Monireh Amiri	Based in Tehran
Mr. Amir Aminrad	Bandar Anzali (Gilan Province)
Mr. Afshin Abutalebi	Fereidoon Kenar (Mazandran Province)

I. National level study in Iran (Annex 14)

II. Community level surveys in western and eastern Caspian provinces in Iran (Annex 15)

Sites selected for the Caspian coastal community surveys:

Western province (close to Azerbaijan): **Bandar Anzali** (Gilan Province)

Eastern province (close to Turkmenistan): **Fereidoon Kenar** (Mazandran Province)

RUSSIAN FEDERATION (RU)

<u>Consultants</u>	<u>Sites</u>
Dr Georgi Ruban	Moscow
Dr Raysa Khodorevskaya	Astrakhan
Mr Gennadi Losev	Astrakhan (Volga River delta)

I. National and regional [Astrakhan « oblast » (Volga River, north Caspian Sea)] level studies in the Russian Federation (Annex 16)

II. Community level surveys in the Russian Federation (Annex 17)

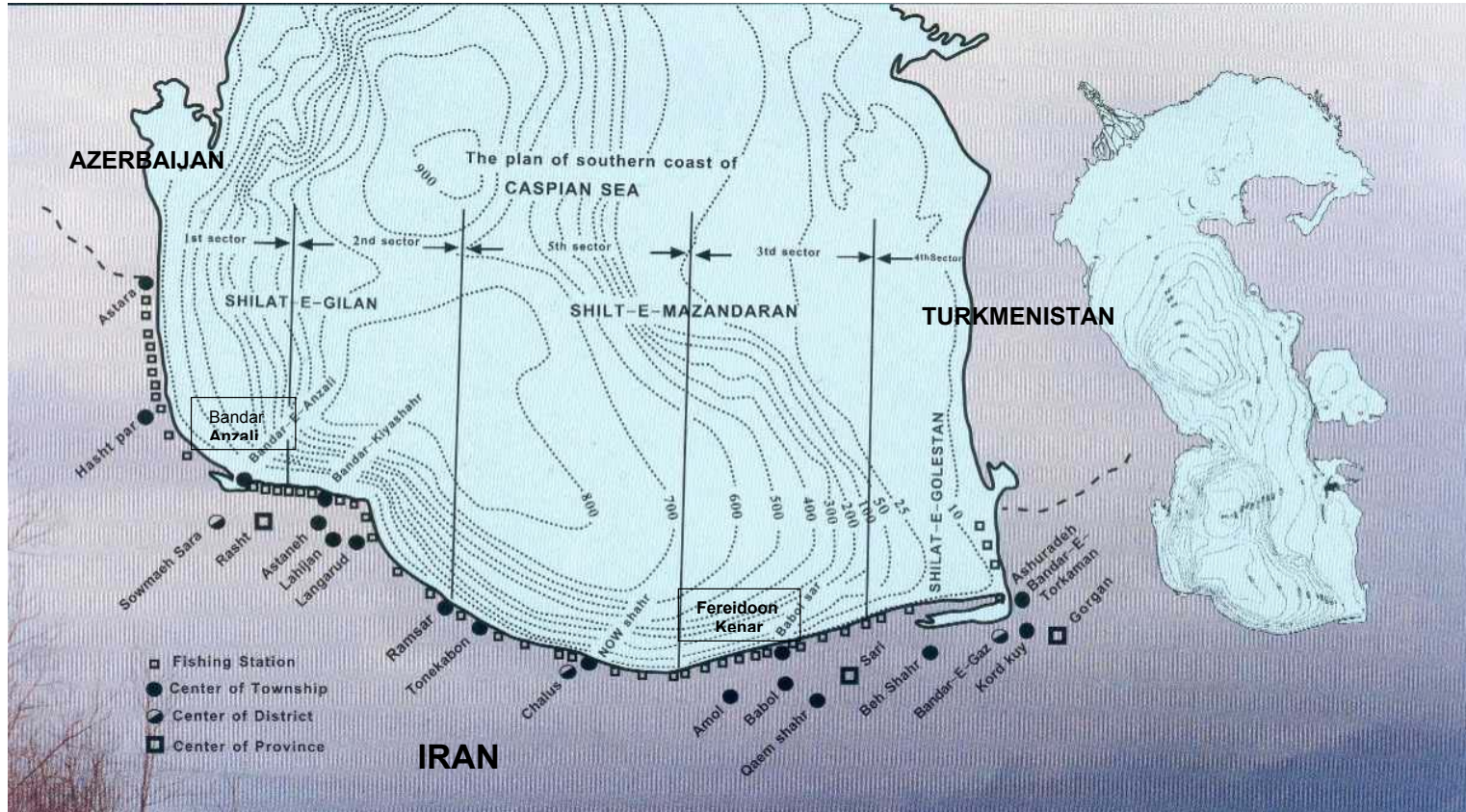
STUDY ON THE SOCIAL AND ECONOMIC ASPECTS OF ILLEGAL FISHING IN THE CASPIAN SEA



Source: Courtesy of www.lib.utexas.edu-maps-commonwealth-azerbaijan.gif

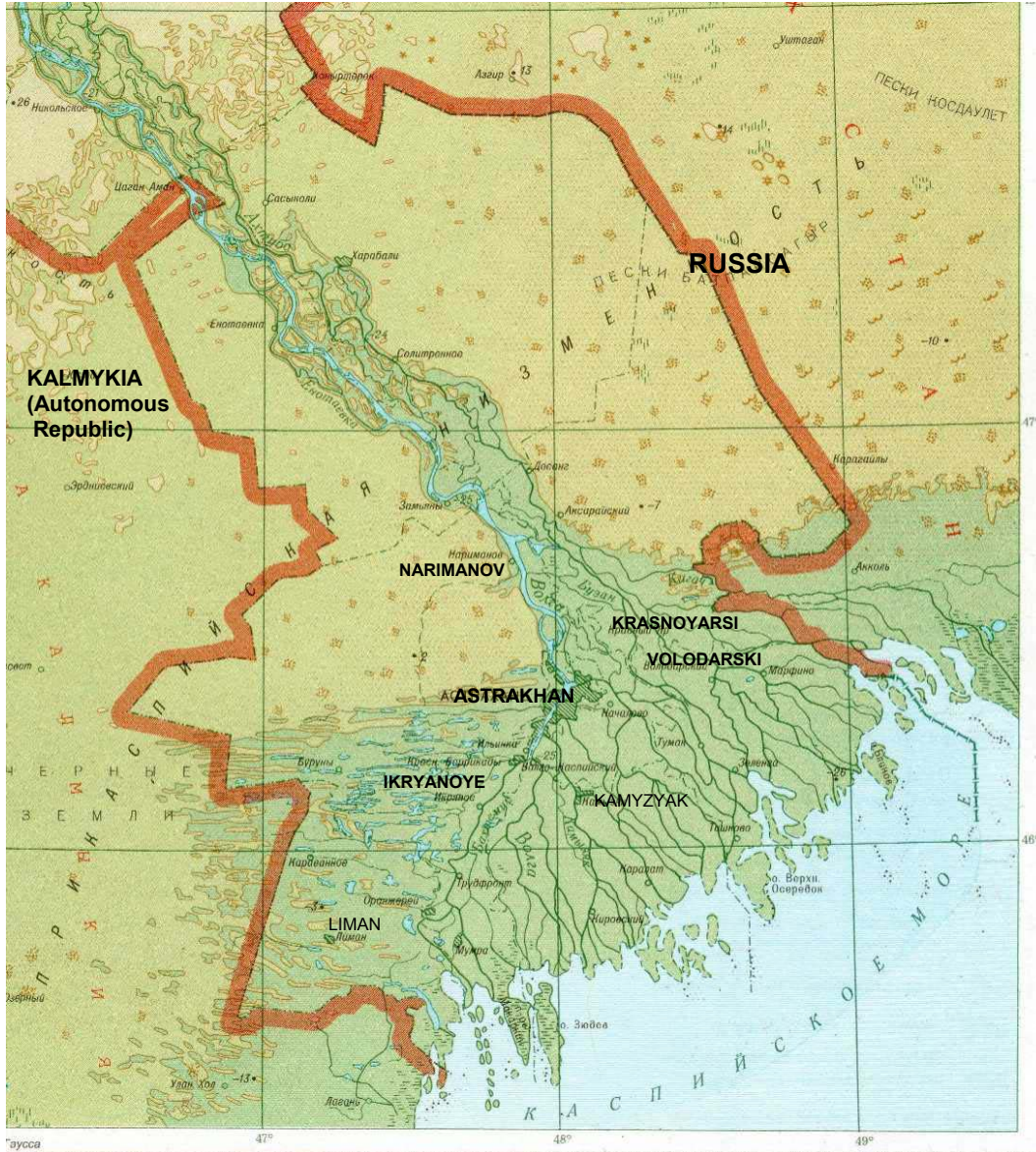
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Iran: Caspian coast



Source: Shilat, Iranian Fisheries Co., 2000

Russian Federation: Astrakhan (Volga River Delta)



Source : Atlas of Astrakhan oblast, 1997 (in Russian)

COMPARATIVE ANALYSIS OF COUNTRY REPORTS (Annexes 11 to 17)

Population in coastal areas

Azerbaijan (Anon, 2001f)

Azerbaijan covers an area of 86,600km², with a total population of 7.9 million (1999); density of about 90 inhabitants/km². In 1999, about 2.5 million people lived in Baku and more than half (51%, 1999) of the population lived in cities. The coastline is about 500km long, with large lagoons in the south.

Islamic Republic of Iran

The 700km Caspian coastline of Iran is inhabited by 6.5 million people with a density of 170 inhabitants/km² against 40 for the country as a whole. Industrial development is low in the region, therefore agriculture, fisheries and all other natural resources are under heavy pressure.

Russian Federation

Demographic increase in the Caspian areas of the Russian Federation from 1986 to 1996

Astrakhan: 5% in 10 years (979,000 inhabitants in 1986 to 1,029,000 in 1996)

Kalmykia: 0.6% in 10 years (315,000 inhabitants in 1986 to 317,000 in 1996)

Dagestan: 14% in 10 years (1,753,000 inhabitants in 1986 to 2,042,000 in 1996, influenced by immigration from neighbouring Autonomous Republics such as Chechnya)

Total in 1996 the Volga-Caspian region: 3,388,000 inhabitants.

More data on human population in Caspian coastal areas are available in other CEP reports.

Cost of living and monthly income, trends since the late 1980s (USD/month/family)

As in most cases, the devaluation of the Russian Rouble (RUR) had major implications on people's livelihood in the former USSR. In the late 1970s, the rate of the RUR to the US Dollars was: USD 1 = RUR 0.75, in the mid 1980s it had dropped to USD 1 = RUR 6 and in 2001 the rate was USD 1 = RUR 29.5. In 20 years time, the value of the Soviet reference currency dropped by 40 times.

Therefore, although the price of bread in Azerbaijan and the Russian Federation increased only by 30% over 20 years (late 1970s – late 1990s) when calculate in USD equivalent, in fact it increased by 23 and 30 times based on prices in RUR.

Although less sharp, in the late 1990s a similar situation was experienced in Iran with the Rial, for which the exchange rate was USD 1 to 4,782 Rial in average in 1997 and 7,960 Rial in December 2001.

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Table 17. Comparison between average monthly cost of living and income in the three countries

(USD/month/family)	Position/Product	Early 1980s		Late 1990s	
		Cost of living	Wages	Cost of living	Wages
Azerbaijan					
Nabran (Annex 12)	Average	42-84	31-64	5-50	
	<i>Shortage (deficit in % of income compared to cost of living)</i>		<i>25%</i>		
Neftchala (Annex 13)	Bread	0.20		0.25	
	Meat (USD/kg)	1.90		3.30	
	Kolkhoze :				
	Head of sturgeon fishing brigade		115		
	Pension				5-8
	Hatchery employees				6-9
	Hatchery manager				15-17
	Fishery inspector				40-50
	<i>Kilka</i> fishermen				70
	Staff at <i>Kilka</i> cannery				100
	Captain of <i>Kilka</i> fish. vess.				200
	<u>Sturgeon poachers</u> (Annex 13)				<u>600</u>
Russia Federation					
Astrakhan (Annex 17)	Average/month	27		30	
	Bread	0.15		0.20	
	Sturgeon meat	4.2		9	
	<i>Kolkhoze</i> team-leader (<i>brigadier</i>)		170		
	<i>Kolkhoze</i> retired team-leader				85
	Manager				85
	Fishery scientist (CaspNIRKh)				100
	Boat driver at a <i>tonya</i> (sturgeon fishing site) only 4 months/year				68
	Sturgeon fisherman at <i>tonya</i>				32
	Hatchery : Fish expert				50
	Hatchery : Technician				32
	Fisheries inspector				27
	Dagestani poachers (Annex 17)				130
(USD/month/family)	Position	Early 1990s		Late 1990s	
		Cost of living	Wages	Cost of living	Wages
Iran	Average in the State fishery sector	?	?		90
(Annex 14 & 15)	Fishermen	?	?		140
	Average on the Caspian coast	?	?	150	
Bandar Anzali	Average	?	?	180	
Fereidoon Kenar	Average in rural areas	?	?	140	500

Level of unemployment and importance of the fishery sector

In Neftchala (Azerbaijan), the centre of the economy in the region was the fish procession factory where all *kolkhozes* were bringing their fish catch, sturgeon and other species (Addendum to Annex 13). The company employed 1500 people to process, prepare and can fish products. It was created in 1860 and used to be a renowned caviar exporter, from 1860 to 1990 the “North East Bank” caviar prepared in Banka (Neftchala) ended in the most famous caviar retailers of Austria, France, Italy, USA and former Yugoslavia. In 2000, the company employed 400 people during a 3 month fishing season, but in 2001 all activities seized. Related jobs have progressively disappeared, but a parallel economy was created simultaneously: for the benefit of few and without the skills and experience of previous professionals.

In Astrakhan *oblast* (province), Russian Federation, the overall level of unemployment in 11 districts is 13.1% (Table 1 in Annex 17), in other words one out of eight people of the economically active part of the population does not have a job. The main cause of this situation is the total collapse of the agricultural sector that was built on the *kolkhoze* structure that carried the essence of the Soviet philosophy (Annex 17). The fishery sector was part of it and fishermen, organised in fishing brigades inside the *kolkhoze*, were fully employed workers as farmers were. The marketing of all products, agriculture, fishery and others, was planned annually by the central government in Moscow. Officially in 2000 in Astrakhan *oblast*, about 10,700 workers were employed in the fishery industry, including staff at fishing sites, processing centres, storage facilities and in the administration. This represented 4.7% of the economically active population of the region (page 6 (1st section) of Annex 17).

In Iran, the prohibition adopted in 1994 of the use of less than 12cm mesh monofilament (nylon) gillnets to prevent the catch of young sturgeon and protect the stocks of this valuable resource, induced significant changes in certain coastal communities (Annex 15). In Bandar Anzali (Gilan Province, western part of the Iranian Caspian coast), five fishing co-operatives were closed down and 368 fishermen had to find another source of income and in Fereidoon Kenar (Mazandaran Province (east), close to Turkmenistan) only 74 fishermen were concerned by the compensation programme. In both cases 67% could stay in the fishery sector. However, in the early 1990s in the Mazandaran province, only 2% (520) of the population were employed in the fishery sector while more than 3% (1063) were in the caviar production industry, sturgeon restocking programmes and other sturgeon products related activities. In addition, the number of fishermen increased by 20% in Fereidoon Keinar (east) and 130% in Bandar Anzali (west) from 1994 to 1998 (Annex 15). But these figures certainly dropped in the early 2000, since a drastic decline in kilka landings was recorded: from 14,000 tonnes (t) in 1999 (Annex 14) to 2800t in 2001 (Financial Times, 17 February 2002).

Awareness and perception of conservation issues related to fishery

Inhabitants of coastal and estuarine areas of the Caspian Sea are well aware of the decline of fish population (Annex 17). However, they are not informed, or sometimes “dis-informed” (mislead) by the local media, of the causes for this decline, the scientific findings on fish stock status as well as habitat deterioration in the Caspian Sea and the bases for decisions regarding fishing restrictions.

Survey revealed that some parts of the population, particularly in cities, perceive the description of threats posed to sturgeon stocks and the potential risk of their extinction as propaganda lead to agitate the people. (see, for Azerbaijan: Annex 13, page 2; and for Russia: Annex 17, points 9 and 10).

Economic importance of sturgeon fisheries and the impact of illegal markets

In 1995, the Astrakhan sturgeon fishery and its production of 140 tonnes of caviar constituted a value of USD 25 million based on the export price set at USD 182/kg for that year (Table 2 and 3 in Annex 17). In 1999, with a 0.35% share in volume of the total catch recorded by Astrakhan fisheries authorities (173,375 tonnes), the sturgeon fishery represented 15% of the total value (USD 108.7 million) with USD 17.8/kg of sturgeon products (mixed, including caviar), while sprat was reported at USD 0.5/kg.

Additionally, the annual income of 1999 caviar exports for the two provinces, Gilan and Mazandaran, represented USD 34 million and USD 550,000 for the 1999 sturgeon meat exports. Considering those figures the drastic decisions to prohibit a non-selective fishing gear such as nylon gillnets to preserve a fishery of particular biological and socio-economic importance may be sound.

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In May 2001, visits to markets downtown Astrakhan, Baku and Moscow revealed that a large number of stalls were selling sturgeon meat and that “undercover” caviar was stocked in large quantities, mostly packed in ½ litre to one litre glass jars, sometimes the caviar (Fresh Malossol –salted) was kept in a plastic bucket and sold in a plastic bag. It was almost never stored in a refrigerator although sanitary and quality precautions require that caviar is kept constantly at –2 to –4°C. The average retail price was USD 50/kg (Annex 4a), even for Beluga caviar. In comparison, the lowest price for caviar observed at the retailers’ end in importing countries was USD 200/kg in 1996 (De Meulenaer and Raymakers, 1996) (more examples of prices observed from 1997 to 2001 are available in Annex 4a).

The Iranian authorities, Shilat, recently installed a system of “call for tender” that allows the country to sell Iranian caviar to a foreign company that has the best profile and offers the best price. In May 2001, the call for tender was won by a European company that agreed to pay DEM 1316 (about USD 600)/kg caviar (/kg). This was confirmed by the media (Financial Times, 17 February 2002) announcing that, in 2001, Iran sold more than 70t of caviar worth DEM 100 million (about USD 50 million).

A comparison of retail prices on local markets (USD 50/kg) in Azerbaijan and Russia with the Iranian exports value (USD 600/kg) illustrates the net loss for the former countries. Indeed, if countries annually produce 100t caviar, the total value at USD 50/kg would be USD 5 million, but USD 60 million when at USD 600/kg. The net loss for the former is USD 55 million, due to caviar sold illegally at cheap prices on domestic market.

Illegal activities and practices around sturgeon fisheries and trade

According to senior villagers, fishermen and non-fishermen that have lived in river delta areas of the Caspian Sea for several decades sturgeon poaching has always existed. A retired fishermen in the Neftchala region (Azerbaijan) (Addendum to Annex 13) declared that, because sturgeon were more abundant, the amount of fish illegally caught was much higher in the 1980s. He remembered that the catch could be as high as 4000-5000kg caught in the river in 8 hours and that the maximum he landed in one day was 7000-10,000kg. During those times poaching was most commonly practised by legal fishermen who had a license, but not necessarily for sturgeon, and were allocated a quota. Landing their sturgeon at unofficial sites allowed those poachers to exceed their quota, or catch sturgeon without having a license.

Nowadays, most sturgeon poachers do not have a license, are jobless and often completely depend on the income from their illegal catch.

Another difference between previous and present illegal operations is their transborder character (Addendum to Annex 13) and their moving network. Indeed, while poaching and trade used to happen in a limited location with a well established and steady structure, the systems that progressively appeared since the late 1980s may have connections throughout the Caspian Sea, e.g. from south Azerbaijan to Dagestan, and is very adaptable to new measures of control with a highly capacity to change rapidly. Modern technology, such as Global Positioning System (GPS) and fast maritime transportation means (Addendum to Annex 17), allowed to develop these new characteristics.

Fisheries experts and enforcement officers reckon that the volume of sturgeon caught by poachers in the northern and western part of the Caspian Sea reached 12,000 tonnes in 2000, i.e. 10 times the level of legal catches, 1,100 tonnes (FAO Fishstat 2001) recorded in the CIS (Commonwealth of Independent States).

Estimates are made from information available from,

- a) helicopter surveys are carried-out by fishery authorities to assess the number of nets set in shallow waters (less than 20m deep) of the open Caspian Sea, which is a vast area expanding beyond 200 nautical miles south of the Volga delta

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- b) the number and types of violations detected by enforcement authorities as well as the quantity of fishing devices (e.g. km of nets, number of “*kalada*” –bottom lines with large unbaited hooks) are used as indicators.

In general, based on their profile (including organisational pattern), the equipment they use and their preferred fishing grounds, the people involved into poaching activities can be classified under two categories: “independent poachers” and “organised poaching squads” (*brigade*) (Annex 17). The various parameters used to describe the type of poaching are as follows,

Profile (Annexes 13 and 17)

- independent poachers:
 - age = 10-70 years old; status = > 25 years, married;
 - criminal record = small conviction/fines for poaching
 - targeted species = non-sturgeon species for subsistence or additional income, products of sturgeon caught accidentally are sold, but if the risk of being caught is too high they will be consumed by the family, including the caviar (greatly appreciated in the region).
- organised poaching squads:
 - age = 25-40 years old, but teenagers can be hired because, in case of arrest, they are not legally liable
 - status = unmarried, mostly “divorced” in order to separate their “former-wife” assets, transfer all theirs on her name and escape heavy fines.
 - criminal record = non, in order not to attract the attention of the authorities
 - targeted species = only sturgeon
 - number of crew members = 4-7 pending the size of the boat and nets (Annex 13)

Equipment, location and volumes of sturgeon caught (Annex 17)

- independent poachers:
 - equipment =rowing boats (3-4m length maximum) and small mesh (5cm) short (15-25m) gillnets (“monofilament”, with fine nylon thread)
 - location = the Volga delta, closed to the village
 - catch = Some independent fishermen do target sturgeon and use “*kalada*”: long lines of large unbaited hooks (Annex 13, p. 3).
- organised squads:
 - equipment =aluminium boats (about 7-8m long) with outboard engine (that is positioned upon departure of the fishing trip) and large mesh (11cm) long (units of 5-15m each tied to each other to reach 150m to 20km length (Addenda: Dagestan in Annex 17) gillnets (thick thread). The presence of nets is no longer detectable from the floats on the surface. Poachers use mid-water floats (not visible on the surface) and are now equipped with a GPS (Global Positioning System) to find the net the next day and collect the catch.
 - location = set most often in the open sea or sometimes in the lowest part of the delta.
 - catch = a brigade of 4 men catch in average 10 fish/day, but the number of gravid female sturgeon is decreasing which presses poachers to increase their fishing effort, either set more nets every day or go further off shore (Annex 17, Addendum: Dagestan).

Legal or traditional gears:

Volga River and delta: “beach seine” operated by a team of fishermen and heavily mechanised winches that perform hauls. The net is in constant movement, each haul taking 20-30 minutes.

Kura River delta and further south in Lenkoran towards the Iranian border: “*katyol*” (fish traps, see cover) constituted of large mesh gillnets held with long wooden sticks fixed in the bottom substrate.

Prices/Value of illegally acquired sturgeon products and poachers' income

- caviar = upon landing, USD 20-30/kg in Azerbaijan but USD 40-50/kg in Dagestan, and at retail level in city markets USD 70-100/kg. The difference between prices of Beluga, Ossetra and Sevruga caviar in producing countries, e.g. <50%, is not as high as in importing countries, e.g. 100% (Annex 4a)
- sturgeon meat = cheaper in Azerbaijan USD 2-3/kg in markets in the area of sturgeon fishing and USD 3-5/kg in city market (Baku). Beluga is paradoxically the cheapest meat. Interviewees claimed that prices rised sharply (e.g. from USD 2-3.5/kg in summer 2001, Addendum to Annex 13) when the moratorium on sturgeon fishing was announced (Annex 17).
- poachers' income (see table 17): in Azerbaijan is as high as USD 800/month, while in Russia the average fluctuates around USD 130/month. In comparison with other monthly revenue in the north (Russia) and west (Azerbaijan) of the Caspian Sea this represents the highest income, and even as much as ten times the average salary recorded, USD 80.

Violations detected and penalties

In Azerbaijan (Annex 11, page 4-6), the number of violations detected in 1999 were 8 times higher than in 1994. It is not known if this increase is caused by intensified poaching or better law enforcement.

In the Volga delta, the inspectorate reported having 5000 lines of *kalada* with 800-1000 hooks/line (estimated total number of hooks 4.5 million) were confiscated in the oblast in 1999. It gives some indication of the importance of illegal fishing effort, taking place at each passage of sturgeon in the delta.

Although a high number of sanctions were imposed in 2000, the level of fines/penalties [Annex 11, page 4 (+ Annexes 9 and 10)] are not dissuasive. For instance in Azerbaijan, the minimal wage is currently fixed at manats 28,000 (USD 6)/month (USD 1 = Manats 4,650) and the highest fine for illegal sturgeon catch is a multiple 100 of minimal wages, i.e. USD 600. However, this equals the estimated average income of organised sturgeon poachers in one month, and is therefore insignificant to them.

CONCLUSIONS

Studies and surveys carried-out for the project in Azerbaijan, Iran and Russia from May to October 2001 confirmed, once more, the continuous degradation of the economy that has occurred in the largest part of the Caspian Sea coastal areas since the mid 1980s and was accelerated by the collapse of the Soviet Union in the early 1990s. The main cause of the present socio-economic situation in the CIS (Azerbaijan, Kazakhstan, the Russian Federation and Turkmenistan) is the complete collapse of the agriculture sector as well as other important economic players, for example major industries such as the chemical complex of Sumgait (north of Baku), and the disappearance of the centralised network of transport and marketing of products as fundamental principal of the former Soviet Union economy. In Iran, daily life on the Caspian shoreline has not been influenced by geopolitical changes in the same way as further north in the CIS, where most countries acquired their independence less than twelve years ago. However, measures adopted and enforced since 1994 by the Iranian government to manage Caspian fish stocks, namely the prohibition of certain gillnets (monofilament), unselective fishing gear with high by-catch of immature sturgeon may have affected the source of income of coastal villagers (see section “Socio-economic aspects outside the CIS”).

The current precarious living conditions of villagers that inhabit coastal areas of the Caspian Sea, particularly the northern and western parts, play a major role in the level of illegal fishing activities occurring in the region. However, the highest impact of poaching and illegal trade on sturgeon population originates from “organised poaching” that involves corruption, wrong enforcement efforts (targeting small independent fishermen instead of leaders of organised poaching operations –which can be supervisors of enforcement officers) and inadequate penal legislation as well as weak prosecution structures.

Awareness of the current status of fish stocks: Although villagers in the CIS are clearly aware of the situation and realise the progressive depletion of fish populations, they do not have a precise and coherent understanding of the issue and decisions made around it. This is mostly due to the fact that reliable information on biological and economical causes of the problem is not accessible or made available to them by relevant institutions (e.g. scientific authorities).

In Iran, the depletion of sturgeon stocks has not been as visible or perceptible. The reason for this lies probably with natural and historical factors. Indeed, in the absence of large river deltas such as the ones of the Volga and Kura, seasonal sturgeon migrations do not occur in the same magnitude in Iran as in the north and the west coasts of the Caspian Sea. Additionally, and related to this natural factors, Iranian sturgeon and caviar production appeared more recently and do not have the same aura and century old tradition as in the CIS.

Poaching: According to senior people who were born and lived their whole life in river-delta areas of the Caspian Sea sturgeon poaching always occurred and, since fish stocks were more abundant in the 1980s, illegal landings were higher than in the late 1990s, although their overall proportion of the total catch were probably lower.

The profile of poachers, however, has changed. Before the late 1980s illegal sturgeon catches were practised most commonly by legal fishermen who had a license, but not necessarily for sturgeon, and were allocated a quota. By landing their sturgeon at unofficial sites, those poachers found a way to exceed their quota, or had the possibility to catch sturgeon without having a license. From those unofficial landing sites the products were channelled to national –inside the USSR (for the meat), and international (for part of the caviar) black markets. Nowadays, most sturgeon poachers do not have a license, are often jobless and completely dependent on the income generated by their illegal catch.

Another difference between previous and present illegal operations is their transborder character (e.g. from south Azerbaijan to Dagestan) and the adaptability of their network that can change rapidly to trespass new

regulations (e.g. CITES documentation) or new control measures (e.g. labelling) with a minimum risk of apprehension. Modern technology, such as the availability of Global Positioning System (GPS) and fast maritime transportation means, coupled with the active involvement and investments made by the “godfathers” of the organised corruption, allowed to develop these new characteristics.

Among fishermen involved in illegal sturgeon catch in the late 1990s-early 2000s, surveys highlighted a clear distinction between two main profiles:

- “Independent poachers” that go fishing for the subsistence of their family, without a license, on their own or with a close friend or member of their family. They have limited means, usually a small rowing boats, and are therefore restricted to a limited range, e.g. along the river or inside the delta, but not in the open sea that is not accessible without a powerful engine. These people target all species of fish and occasionally catch a sturgeon that they can not always sell to the black market not being part of their networks although caviar, which is more easy to hide than the whole fish, usually finds its way to illegal channels; and
- “Organised poaching squads” that are engaged in illegal fishing (absence of license) exclusively to sell their catch only target sturgeon species. The average income of a member of such squad in Dagestan in 2001 was almost five times the monthly wage of a fisheries inspector in Astrakhan, USD 130 per month. They work in teams of 3 to 7 or 9 men, are well equipped and operate exclusively in remote areas, i.e. in the open sea or lowest parts of the delta where there are no human settlements and little control by enforcement officers that have limited capacity, e.g. lack of funds for fuel for their engines. These squads are part of a network and the caviar they produce is usually promised to a middleman, often by radio contact, as soon as the volume extracted from the daily catch is known.

Although their impact on the sturgeon fishery is minor and their revenues are more limited, independent poachers are most exposed to controls and fines essentially because of their accessible range of operation, the river, and their lack of connection to networks that have ramifications inside enforcement authorities.

As a consequence, the attitude towards a change in live-style, i.e. give-up poaching, of the members of each group is radically different. Independent poachers are keen and ready to abandon poaching activities if they are provided with a steady job and descent income (USD 100 per month in 2001), while members of organised squads claim that, since the risk is low compared to the profit, it will always be worth and they would “*go fishing as long as there is sturgeon out there*”.

Socio-economic aspects outside the CIS: In Iran, the 1994 decision of the national fishery authority to prohibit the use of certain types of gillnets, less than 12cm mesh monofilament gillnets made out of nylon, was accompanied by a financial compensation plan that allowed fishermen to start another activity. Unfortunately, the money was not distributed equally amongst the fishermen concerned, training was not part of the scheme and some people could not find an alternative to their fishing activity, which led them to engage in illegal fishing. However, according to the results of surveys in two selected areas, the number of fishermen that started poaching does not appear significant: 36 people in total, or about 1.5% of the 1998 reported population of fishermen on the surveyed sites. These figures suggest that the level of unemployment generated by the prohibition imposed on unselective fishing gear to manage the valuable sturgeon fishery is particularly insignificant in comparison with the number of jobs that depend on the sturgeon fishery and the income it generates for the region. For instance, in the early 1991, the caviar sector employed 1100 people in Mazandaran province (more than 3% of the active population). Also, the average annual value of Mazandaran province sturgeon fishery in the late 1990s was estimated at USD 18.5 million (98.5% composed of caviar exports and the remaining 1.5% of meat sales).

Economic losses and profit for the Caspian nations: An estimation of the direct impact of illegal sturgeon fishing and trade practices consisted in comparing local black market prices and official export value. The result was an estimated loss of USD 55 million in 2001 for range States where illegal channels are most

In addition, poaching and smuggling have an indirect economic effect due to the weakening of confidence of importers' in caviar from countries where the quality of supply can no longer be certified. In 1999, the official export value of caviar from Russia was USD 220/kg (Annex 16), while it was USD 380/kg for caviar from Iran (Annex 14). The same year Russia exported 60t for a total value of USD 13 million, which would have brought USD 23 million to Iran. This represents USD 10 million loss for Russia that could partly be attributed to the deterioration, on the international market, of the previous exclusive image of "Russian caviar". Customers' confidence shifted to the "black pearls of Iran".

Loosing the reputation of an exclusive commodity such as caviar could have additional secondary economic impacts such as affecting the tourism of prestige, because a certain range of visitors is attracted by the image of exclusivity and will choose a destination where a combination of services are offered. Eating fine caviar would be one of them.

International measures: Besides regional projects such as CEP and a similar initiative undertaken by UNDP in the Black Sea, CITES has been the most active forum in the promotion of decisions that could impact the conservation of sturgeon and paddlefish species world wide. The continuous decrease in official landings of sturgeon reported by range States and the alarming results of recent surveys in the Caspian Sea (Anon. 2001), particularly the ones revealed in the report of the summer 2001 CEP fisheries expedition, as well as Danube River (Kynard *et al.*, In press (a)) basins, lead certain experts to believe that higher protection under CITES provisions is necessary. The perspectives of recommendations adopted at CITES CoP11 and at the 46th meeting of the Standing Committee (SC46) held in Paris in June 2001, bring-up two controversial approaches:

- impose a ban on catch of and trade in specimens from the Caspian Sea, or rather
- make progress within the existing legal and administrative framework, by advising on specific efforts (research, biotechnological development, etc.) and encouraging transboundary dialogue.

Signs of the continuous worrying decline in stocks and evidences of the lack of progress made in the conservation of *Acipenseriformes* by nations concerned, may warrant firm action to be taken by the Standing Committee to encourage countries involved in the "Paris agreement" signed in June 2001, including the possibility of imposing zero quotas for selected species, which is equal to an annual export ban. In addition, it is possible that one or more CITES Parties submit a proposal for Beluga, *Huso huso* up-listing from Appendix II to Appendix I of CITES for adoption at CoP12. The adoption of such proposal would mean that more than 150 countries that are Parties to CITES, including all major caviar exporters and importers, agree to stop all international trade in Beluga specimens.

However, other experts tend to emphasise the risk that such actions may adversely affect the more crucial efforts that Caspian nations have committed themselves to and thereby jeopardise the achievement of the related objectives, namely improvement of fisheries management and trade controls to decrease the pressure of catch on sturgeon populations. More importantly, specialists in a wide range of fields claim that chances are high that an Appendix I listing would have substantial negative effects (listed in Annex 5 of this report), one of the major ones being the risk of reducing, or eliminate, the political will to protect and allocate funds for the enhancement of fish species that have lost their value on lucrative export markets. They also believe, and this is supported by the results of the present project study (Annex 4) and surveys (Annex 17),

- that, in comparison with the growing domestic demand, the export market may no longer be the main current source of threat, and
- that, since such prohibition will not prevent corruption (on the contrary), it will not be efficiently enforced, and
- consequently not be able to reduce poaching and its impact on wild sturgeon populations.

Finally, experts have identified numerous actions that should be undertaken before imposing the prohibition of commercial international trade in a species (see in *Restoration and conservation of Caspian sturgeon populations in the wild* under Recommendations). Among them are two that the CITES forum is actively developing: firstly a revision of the universal labelling system for the identification of caviar that includes

among others, the expansion of the scope of Resolution Conf. 11.13 adopted at CoP11 to re-exports, all sizes containers, indication of the source of the caviar, such as wild and captive-bred, and the submission to the CITES Secretariat of copies of permits and certificates by Parties as soon as they are issued and an annual update of the official national list of registered processors and traders; and secondly ensuring the joint setting in the Caspian Sea of annual sturgeon and paddlefish catch and export quotas for 2002 and future years.

RECOMMENDATIONS

Most of the following recommendations are made towards the improvement of socio-economic conditions in coastal villagers and of increased scientific and technical knowledge on the current conservation needs for migratory fish populations, with focus on sturgeon species. However, as mentioned in the conclusion, emphasis should be put on the fact that these actions will not improve the living conditions of rural communities or the status of natural resources without a better and more realistic enforcement system, including priority given to a significant reduction of illegal domestic trade.

Awareness of the current status of fish populations and equitable sturgeon fishery

1. **Contribution of coastal villagers:** Experience has shown that awareness raising is often best achieved through the active involvement of the public or a selected audience in conservation programmes such as the monitoring of environmental conditions (Runstrom *et al.*, in press; Quinlan *et al.*, in press; Parker and Rein, in press) and of levels of harvest of natural resources (Rasmussen, 1999). Over the past two decades, the knowledge of local communities has increasingly been taken into consideration to assist in formulating sound and realistic management plans. For the appraisal of rural and/or urban communities perception of nature conservation and the its related benefits (Roe, 2001), standard methodologies have progressively been designed and need to be used on ad hoc bases, e.g. the use of short multiple-choice questionnaires (Beamesderfer and Farr, 1997).

Recommendations: The participation of the public or a selected list of stakeholders should be seen from a variety of angles (Roe, 2001) including,

- contribution to scientific work through data and information collection. The link between coastal communities and scientists would give the opportunity to ask question and access the information at the source, without having to rely on government officials or superficial reports in the media.
- participation in habitat restoration, e.g. where feasible and based on scientific information, invite inhabitants to physically assist in the rehabilitation of parts of the river to facilitate the migration of adults or juveniles
- participation in management planning using maps and organising informal gatherings to bring-in knowledge about the area
- integration to school programmes, e.g. incorporate in the curriculum the history of sturgeon and its role in the region's traditions and, for older pupils, prepare a simple methodology for the monitoring of parameters such as regular measurements of the water level in the river,
- contribution to enforcement work: this type of activity can only be envisaged after dialogue with local authorities has been established and confidence in each party is shared.

Finally and although this option, based on 2001 survey results, seems unrealistic at this stage and in the near future, the possibility should be considered and progress should be made towards the allocation of a fishing concession to an adjacent community. In other words villagers could lease fishing rights on part of the delta that is preferably close to their homes.

The above list of actions, besides giving villagers recognition of their knowledge, aims at

- an improved understanding of the status of natural resources and measures needed;
- a better relationship between the population and decision making authorities (scientific, fisheries and enforcement officers) with the possibility of influencing their decisions;
- the revival of traditional and cultural values of these natural resources (see work with schools); and
- possibly, financial and social benefits if related activities lead to the creation of new jobs.

2. **Fishing companies responsibility in a fair and equitable sharing of benefits:** In most of the CIS, on the Volga River for instance, sturgeon fishing licenses are auctioned and thereby issued to fishing companies that offer the highest financial contribution. However, together with the right to fish, these companies should be given the duty to provide sufficient income to the fisherman they employ and monitor, manage and protect the sturgeon resources they exploit. Indeed, fish products is the main component of the livelihood of the people who live along the river the salary of fishermen employed by fishing companies should reflect the value of the fish that is caught. Fair wages to fishermen involved in the fishery, i.e. sufficient to cover the cost of living of a family settled in river and coastal villages of the Caspian Sea, is the first step to reach an equitable fishery. The mechanism for allocation of fishing licenses must therefore, as a priority, ensure that it will benefit local fisherman, who otherwise may have no other alternative besides poaching, is necessary to prevent villagers from engaging in poaching –see **Results of national studies and coastal community field surveys –Annex 17)**

Recommendations: The issuance of fishing licences should be limited to companies that fulfil specific terms of references (ToR). These ToR must be defined and legally agreed upon by the company. The authorities should verify the accuracy of the content of the fishing company’s application for a fishing licence. They should include among others, a clear commitment to an equitable employment scheme and procedures for its achievement including

- jobs for inhabitants that are professional fisherman who live in rural areas of river, delta and coastal zones, particularly along the Kura (Azerbaijan), Terek (Autonomous Republic of Dagestan of the Russian Federation) and Volga (Russia) rivers, instead of hiring people who come from urban communities and may have connections within the company, and
- adequate socio-economic conditions of staff members (in correlation with the company’s financial profit generated from the high value of sturgeon products on the international market)

3. **Sturgeon auction:** The purchase of sturgeon catch by processing companies should not be limited to a handful of buyers that may block prices at low level, as it is currently the case in the Astrakhan region.

Recommendation: as most fish around the world sturgeon should be auctioned at the landing sites in order for prices to reflect the real commercial value of products, i.e. related to both national and international markets demand. The probable boost of prices offered by buyers that participate in the auction, e.g. processing, exporting and possibly foreign importing companies, would increase the company’s financial income. The latter should in turn profit the staff, bring a decent living to fishing communities and decrease the incentive for legal fishermen to sell their catch, or its products, on the black market.

4. **Sturgeon sport fishing and tourism:** In numerous countries, including Russia, e.g. fish pond with sturgeon for leisure fishing in Moscow, and particularly the United States, sport fishing of sturgeon and paddlefish has become a lucrative business.

Recommendation: Linked to the recommendations about “Captive-breeding” (or aquaculture) (point 5), but also, although indirectly, to the “Restocking programmes” (point 7), and to the tourism industry, the development of such activity should be promoted and investors attracted.

5. **Captive breeding (aquaculture/fish farming):** the production of sturgeon and paddlefish in captive breeding facilities may lead to the introduction in the wild of pathogens that develop in artificial conditions and of hybrid strains that affect the original species. Although existing sturgeon and paddlefish farms are targeting high quality image of sturgeon and paddlefish products, intensive farming may lead to a decrease in quality of sturgeon and paddlefish products due to feeding and hormonal treatments used to increase the productivity of fish farms. However, the development of sturgeon and paddlefish farms in range States is a source of new jobs in regions where unemployment and lack of decent economic income may lead local villagers to poaching and smuggling of high priced resources such as caviar and sturgeon meat. Also, although closed cycle captive breeding facilities exist, the use of wild broodstock (gravid females and males) to obtain good hatching and juvenile survival rates is an incentive to continue to protect wild stocks around farms that are developed in range States.

Recommendations: Aquaculture of Acipenseriformes species may be supported as an alternative economic income in range States and as a mean to keep the historical quality standards of caviar around the world. But such support can only be considered if a strict code of conduct is enforced, including the use of fodder that complies with precise sanitary rules (e.g. source of components, particularly meal and oil), the limitation of antibiotics and hormonal treatments and the maintenance of high intra-specific genetic diversity.

In addition, the code of conduct should take into consideration the following parameters,

- 1) Introduction of exotic species to develop aquaculture operations should be avoided due to the high risk of fish escape and possible damage to native species in case of escape, due to
 - a. potential competition on feeding grounds,
 - b. possible hybridisation with native species [sometimes close to extinction, e.g. *A. sturio* in western Europe and *Psephurus gladius* (Chinese paddlefish) in the Yangtze River in China], and
 - c. introduction of new pathogens against which native populations are not immunised.
 - 2) Sturgeon farming facilities should be conceived/designed to function autonomously. This comprises
 - a. the broodstock (females and males) that is needed to produce the fry should not be sacrificed when reproduction materials are collected and kept for future use. Aquaculture facilities should be designed to function autonomously, particularly with regard to sturgeon broodstock. This means that each sturgeon farm should have the necessary technology and be equipped to perform artificial reproduction without sacrificing female or male and keep them in ponds where they are fed and maintained as long as needed to provide for future production cycles. Special ponds designed to keep the broodstock should be constructed. Sturgeon adults should thereby be maintained and fed during the necessary number of years to be mature again, time estimated at 3 to 4 years)
 - b. the capacity to produce on-site food supply for certain fish ages
 - c. initiate/stimulate the local production of fish feed (industrial or artisanal) (Raymakers, 2001b)
 - d. the creation of employment inside and outside the region: b. and c. should bring more jobs at the farm as well as in the country by developing the feed industry.
6. **Resources for sturgeon conservation:** resources must be available to cover the cost of sturgeon stock management and restocking programmes.

Recommendation: Caviar processing and trade companies (export and import) should participate in conservation efforts, for instance the first could be required to supply the hatcheries with adult sturgeon free of charge to support the restocking programme and the latter (traders) could directly support the expenses of scientific research for the monitoring of catches and wild populations (linked to point 5).

Restoration and conservation of Caspian sturgeon populations in the wild

7. **Restocking programmes:** In the late 1990s, certain countries tried to maintain, and even increase, their official number of sturgeon individuals released annually by their national restocking programmes. A closer look at these results reveal that the size of the individual (not yet a fingerling) at the time of its release is two times smaller than it used to be, which greatly decreases its chance of survival in the wild (Arlati *et al.*, 1999). The scarcity of adult sturgeon necessary to supply the reproduction material to perform the artificial breeding needs to be addressed, keeping in mind the need to preserve the genetic diversity of the species.

Recommendations: In order to optimise the efficiency of restocking programmes and avoid genetic erosion when keeping the broodstock for successive artificial reproduction cycles the restoration of wild sturgeon populations should include,

- the identification of the most adequate habitat, e.g. distance from the sea, substrate, water quality, for the release;
- the selection of the most appropriate size at the time of release, e.g. not too small to prevent exposure to predators and other threats, and not too large to avoid the loss of adaptability of some species at early stage of their life.

These two points can be achieved through the essential monitoring of fish released (Jackson *et al.* In press) that will involve the tagging of specimens released (Andreasen, 1999), accompanied with an in-depth international literature review.

With regard to breeders, for the ones that have not yet started, hatcheries should engage in the development of efficient broodstock rearing programmes to prevent systematic/annual extraction of mature fish from the wild. Such programmes include the understanding of their nutrition, required environment conditions and identification of gene pool (see point 9), is imperative to ensure that such programmes are sustainable (minimum catch of mature fish from the wild) biologically sound (preserve the species genetic diversity and prevent erosion of gene pool)(the latter is also applicable to point 5).

8. **Natural spawning grounds, wintering spots, juvenile feeding grounds and migration patterns:** Knowledge on the present status of sturgeon habitats throughout their life cycle, particularly in rivers, is lacking.

It is commonly admitted that the construction of dams on the Volga, Kura and Sefid Rud rivers caused the loss or blocked the access of more than 90% of the Caspian sturgeon natural spawning grounds (Birstein, 1993). However, surveys performed in the Lower Danube River suggest that these highly adaptable species searched for and adopted new spawning grounds downstream the “Iron Gate I & II” dams (Staras, M., pers. comm. to TRAFFIC Europe, September 1999). Similarly, the life cycle of most sturgeon population depend on wintering spots or areas where their mature spawners interrupt their long upstream migration to rest and enter in a physiological hibernation stage when outside temperatures are the lowest (Staras, M. pers. comm. to TRAFFIC Europe, September 1999; Anon. 2001g). As important as the behaviour and priority areas for adult sturgeon, is the feeding grounds and migration pattern of sturgeon at their earliest stages.

Recommendations: Studies should be undertaken to draw a precise picture of priority areas to be managed and protected for the survival of sturgeon in the wild and the natural enhancement of their populations. Tagging and telemetry should be considered for this work (Kynard *et al.*, in press (b)).

- The characterisation, identification, mapping, monitoring and protection of existing natural spawning grounds (Kynard *et al.*, in press (b)) and wintering spots as well as areas that may potentially be developed in semi-natural ones (Bruch, 1999) must urgently be undertaken and achieved in all major tributaries of the Caspian Sea. These tributaries include in particular the Volga

River (Russian Federation), the Kura River (Azerbaijan), the Ural River (Kazakhstan) and the Sefid Rud River (Iran).

- A similar work is needed in to enhance sturgeon survival at its early stages: from the time the fry hatches to the time the juvenile fish leaves the river to enter the Caspian brackish-water body. Therefore it is essential to design and implement protocols for better understanding of hatchlings and fingerlings behaviour, particularly their migration patterns (Taverny *et al.*, in press), daily as well as in on a wider timescale (Kynard *et al.*, in press (b)). These protocols must be integrated in studies and surveys on the characterisation, identification, mapping, monitoring and protection of existing juvenile feeding grounds.

9. **Species genetic diversity:** The alarming decline of wild sturgeon populations, coupled with artificial breeding programmes and the introduction of exotic sturgeon and paddlefish species in a wide range of river basins raised scientists' concerns about the present status of the gene-pool of some of the populations (Ludwig, in press).

Recommendations: From the large number of restocking programmes undertaken around the world for the past 20 to 40 years it became evident that it is indispensable to include genetic analyses in population management programmes and include the maximum possible genetic variability in the artificial reproduction plan (Ludwig, in press). This should not only be performed on individuals captured for and released by hatcheries, but genetic analyses and screening should also be carried-out on wild specimens, e.g. capture, sample and analyse the genetic characteristics (fingerprints, parental) of wild sturgeon specimens at any age.

10. **Dam management for an optimal Seasonal fluctuations of river flow and improvement of dam “fishways” or “lifts”:** The water level and flow in Caspian Sea tributaries are a key parameter to seasonal migration of sturgeon (Schaffter, in press). Due to human activities, such as dam construction, hydrobiology of rivers is no longer natural, its flow does not fluctuating naturally and there is a need to recreate the seasonal variations (St Pierre, 1999). In addition, dams caused among others the loss of the largest part of the spawning grounds by blocking their access, the fragmentation of populations, mortality related to turbine and hydro-electric power devices. Safe, adaptable and efficient passes for adult sturgeon to migrate beyond dams have not yet been fully developed, but progress was made for particular cases (Bruch, 1999; Lagutov, V., *in litt.* to TRAFFIC Europe, October 2000).

Recommendations: Without considering the restoration of the natural flow of the river, improvements can be brought to support the recruitment of fish stocks and rehabilitation of other aquatic species

- The main users of freshwater resources of each of the river basins in the Caspian region should create « **Round tables of key stakeholders** », particularly dam managers (hydroelectric power), agriculture and fishing companies. This formally established body would establish annual plans of water use and schedule of intake in accordance with the seasonal needs of migratory and semi-migratory fish populations (more than 80% of Caspian fish species, e.g. sturgeon, salmon, herring). On-going consultation and feedback should be happening between round table partners.
- The efficiency of fish lifts that currently exist in the Caspian Sea basin and new, or other existing, systems should be tested to verify the feasibility of sturgeon migration beyond the dam and, if positively assessed, identify the most appropriate design in each case, e.g. Volgograd on the Volga River and Mingechaur reservoir dam on the Kura River.

National mechanisms to restrict sturgeon fishery and trade, and contribution of stakeholders to management as well as catch and trade control measures

Commercial exploitation and trade in sturgeon products should not be prohibited. Instead all measures should be taken to increase the benefit derived from the fishery and the trade, provide a fair share to stakeholders involved (see point 3) and ensure that the control measures adopted to prevent over-exploitation are effectively enforced.

11. **Fishing licences:** Linked to the above recommendation on the socio-economic responsibility of fishing companies, these key stakeholders that exploit valuable natural resources should also be involved in the management and protection of the fish stocks their business depends upon.

Recommendations: The number of sturgeon fishing licenses issued should be restricted to a limited number of companies (“private monopolies”) that have been screened and have agreed to comply with comprehensive Terms of Reference that include, clearly defined socio-economic and environment obligations. As mentioned under point 2 above, in the context of the ToR that must be defined and legally agreed upon by the fishing company, the authorities should verify the accuracy of the content of the fishing company’s application for a fishing licence and its compliance with the required ToR particularly regarding the system and structure that the company established to provide for

- monitoring of catches, recording parameters using standard methodologies;
- the management of sturgeon stocks on the company’s fishing grounds, such as:
 - ❖ establish “no-take” zones on spawning grounds and other relevant areas, and
 - ❖ apply escapement rates based on biological and habitat parameters (J. Caddy, *in litt.*, November 2001). The effectiveness of this initiative depends on the geographical distribution of fishery concessions, i.e. allocation of concessions per “arm”, instead of per section of the same arm, of the Volga delta. The repartition of fishing concessions should allow to constitute a “parallel alignment” of fishing stations in which companies would be neighbouring each-other on different “arms” of the Volga delta for instance. This would avoid a succession of companies from down- to upstream that greatly decreases the chance of escapement of adult sturgeon (Secor, 2000) and other migratory fish species;
- effective control measures to be enforced by the fishing company on its fishery concession(s) to prevent illegal catches and thereby over-fishing;
- a formal agreement with scientific experts that must be associated as observers of fishing operation for the collection of all data on fishing/landing sites and monitoring of the catch per unit effort (CPUE) to perform preliminary stock assessments; and
- the obligation to contribute to sturgeon stock enhancement programmes by supplying hatcheries with annual quotas (per species) of adult specimens particularly adequate to artificial breeding (e.g. ovary at a late maturation stage) (related to point 7 above).

12. **Enforcement and relevance of existing sturgeon fishery regulations:** A comprehensive legislation regulating the sturgeon fishery and trade in its products is in place in most Caspian range States. However, besides the concerns raised regarding the lack of enforcement of those rules, the thresholds used to select the limits do not all seem in accordance with the biological parameters of the species (Beluga, Ship, Stellate, Persian and Russian sturgeon).

Recommendation: Most sturgeon fishing regulations should be revised taking into account the biological characteristics of each species that have been studied for more than one century, particularly with regard to: the minimum size limits selected for each species, the fishing season and the distribution of fishing grounds allocated to fishing companies.

13. **Catch quotas:** Recent scientific and fisheries data have not been made available to understand the basis for calculation of catch quotas that have been established by governments since the early 1990s.
Recommendation: Catch quotas should be based on sound and verifiable scientific data that define the status of wild populations, including their distribution, migration patterns, age composition and sex ratio. They should also take into consideration the level of sturgeon caught as by-catch by gears of other fisheries. Finally, if restocking programmes are used as basis for the allocation of a catch quota, the number of sturgeon individuals (fingerlings) released in the wild to participate in the rehabilitation of the fishery stock should not be the reference of success of the programme. It should rather be the estimated number of sturgeon fingerlings that will reach commercial catch size that should be calculated based primarily on the survival rate at young age accompanied with other factors.
14. **Export quotas:** The average rate of caviar content that is used to calculate annual export quotas (e.g. 13% in Iran and 11% in the Russian Federation) (Annex 6) based on annual catch prediction seem higher than rates estimated by scientists, i.e. in average 7.5% of the overall catch, including females and males. The lack of data on the status of wild sturgeon populations, e.g. estimated size of stocks and sex ratio, and the limited, or total, absence of knowledge (Anon., 2000d) on the level of domestic market (local consumption) leads to immediate questions on the basis used to calculate and determine export quotas.
Recommendations:
- On-going monitoring of catch, export quotas and real levels of export as well as domestic consumption is needed to verify if levels established are biologically sound and if the trade does not exceed the quotas.
 - Additionally, scientific/technical projects must be developed to collect data on the current status of sturgeon populations, their habitat (quality, hydrological parameters such as water current, etc.) and migration pattern at various ages (juveniles and breeders, etc).
 - International organisations, including FAO, should be consulted for financial and technical support (Kelleher, 2000). National and multi-national scope projects concepts must be formulated and submitted to implement standardised scientific protocols for each relevant biological subject.
15. **Domestic trade control and Traceability of sturgeon products:** Transportation, trade in and possession of quantities of caviar are strictly regulated in all Caspian range States (Annexes 9 and 10). Health and certificate of origin are required as well as a special license authorising caviar sale. However, sturgeon products are readily available in fish market in Astrakhan, Baku, Machatchkala [Autonomous Republic of Dagestan (Vaisman, 1997); Annex 13 and 17] Moscow and other cities around the Caspian Sea. Their prices have decreased in the late-1990s (Annex 4 a-b) (Vaisman and Raymakers, 2001).
Recommendations: Enforcement of existing legislation that regulates trade in sturgeon products inside borders of range States of Acipenseriformes is lacking and should be prioritised. Especially since investigating markets, shops and small merchants is certainly more cost effective and less risky than apprehending illegal fishing operations and trying to arrest well equipped poachers in the open sea. Domestic control, traceability of products and enforcement should be improved using a variety of instruments:
- The control of fishing, processing and marketing should be intimately linked. Therefore, license given to the fishing companies should include processing and marketing of sturgeon products. In other words, the fishing companies should be given the exclusive right to process, package, transport, store and export the sturgeon products of its catch. Thereby, fishery management and trade control are merged (inseparable), which fully supports the “traceability” of sturgeon products throughout the chain of custody that, in turn, greatly eases enforcement efforts;

- The list of companies and their registration number should be submitted to the CITES Secretariat to enable efficient implementation of the *Universal Labelling System for the Identification of Caviar* (Resolution Conf. 11.13) adopted in April 2000 (CITES CoP 11);
 - All efforts should be made to improve identification of products: per species, per source (Wild or Captive Bred, i.e. farmed) and per origin (fishing company). A label, complying and completing the existing CITES label, should be designed and a safe production plan for these labels (responsible authority), to be affixed on ALL containers produced in range States, regardless of their size. Aquaculture facilities should undertake the necessary research to record and report the parental gene pool (broodstock genetic fingerprints, see point 5 above) of their offspring in order for authorities to be able to distinguish their products from products of wild caught sturgeon;
 - The system adopted at CoP11 for CITES a control of caviar entering international trade (Resolution Conf. 11.13) is not applicable to products destined to the domestic retail market, but range States authorities should adopt a domestic system that complements international requirement.
 - Transportation of product, particularly by train and roads from the Caspian region), at the “exit gates” of the region, e.g. train station in Astrakhan, Baku and Machatchkala, is common and well-known. Enhanced and systematic control of vehicles (cars, trucks, trains) that travel on these routes is necessary and its cost should be included in a budget common to sturgeon fisheries and trade control efforts.
16. **Anti-poaching measures:** In addition to domestic trade control measures that should substantially help to decrease the demand for illegally acquired sturgeon products, focus should be put on open sea poaching from where the highest share of illegal landings originate. Such measures imply high financial cost destined to
- increase the salary of enforcement officers at all levels and especially provided for compensation and bonus at each successful anti-poaching operation,
 - purchase new enforcement equipment: faster engines for enforcement vessels, GPS, hook and net detectors (where available), etc., and
 - development of a computer/software system and staff training to establish formal exchange of information between authorities inside the country and between countries, particularly Azerbaijan and the Russian Federation.

International mechanisms to restrict sturgeon fishery and trade

While total long term bans on catch and export of certain species of Acipenseriformes has raised concerns among stakeholders (see Conclusions), moratoria on sturgeon fisheries and/or zero annual export quotas that can be adopted by CITES Parties are needed to assist in the conservation of those species. Keeping in mind that their direct impact on the status of wild populations is probably limited because,

- a moratorium on sturgeon fishery will not immediately and significantly reduce poaching activities due to weak enforcement capacities at local and national levels that have been the cause of the absence of enforcement of existing catch quotas; and for similar reasons
- zero annual export quotas will not immediately significantly reduce the smuggling of caviar and sturgeon meat since they will not influence the rising domestic market and the enforcement of existing CITES provisions that already impose strict export and import control measures.

Nonetheless, temporary prohibition of sturgeon catch and/or exports are relevant and should therefore be recommended if they are accompanied with all necessary actions for,

17. CITES zero export quotas for sturgeon and paddlefish specimens from the wild

- to raise range States' political interest in the conservation of those species because zero export quotas are complementary to national regulations in place,
- to lead to improved fisheries and trade controls through a list of activities and commitments that the governments involved agree to achieve within a specific timeframe (fixed deadlines),
- to encourage strong enforcement of existing legislation that regulates and limits domestic markets, and
- to raise proper international awareness of the local problems and needs linked to sturgeon fisheries and trade, e.g. existence of important domestic consumption and role of socio-economics in the region;

18. a moratorium on sturgeon catches

- to press for a substantial consolidation of enforcement structures and capacity, including the allocation of funds that will render the application of anti-poaching laws feasible,
- to lead to improvements in the structure of the fisheries industry, e.g. increased involvement of the companies in the management and control of sturgeon stocks exploitation, share of benefits within the fishing companies,
- to raise the correct understanding by coastal communities of the causes of sturgeon fisheries crisis and the reason for adopting a temporary prohibition.

In addition to measures addressed to range States, international measures should target countries that are also directly benefiting from sturgeon fisheries, namely the re-exporting and consuming nations.

19. CITES universal labelling for the identification of caviar: re-exporting and consuming nations should support the revision of the existing Resolution (Conf. 11.13) at CoP12 and thereby commit to all efforts necessary to efficiently trace all caviar (including containers of less than 250g) from retailers to exporters ends.

20. Re-exports of sturgeon products from dubious sources: As described in the document, routes of smuggled sturgeon specimens are by and large quite well known, particularly when they involve a high value commodity such as caviar. In order to strongly discourage travellers and commercial companies to participate in illegal activities that bring to all (amateurs and professionals) an easy additional income, governments of importing nations should,

- Pay special attention to re-export certificates issued by CITES Parties Nations repeatedly mentioned in reports on trade in fraudulent shipments, e.g. Poland;
- Officially inform their customs officers of the existence of such well established routes and instruct them to check bags of passengers coming from those countries and provide them with guidance e.g. United Arab Emirates (especially Dubai); and
- Organise specific training for customs officers assigned to border controls where sturgeon products are reputedly smuggled by surface (car, trucks, trains, ship/ferry, ...), e.g. eastern Europe.

REFERENCES

- Anonymous, 1999a and 2000a: CITES Annual Reports from CITES Parties. World Conservation Monitoring Centre (WCMC).
- Anonymous, 1998a, 1999b, 2000b and 2001a: Notification to the Parties concerning annual export quotas No. 1998/36, 56, 61 and No. 1999/21, 34, 47, 53, 68, No. 2000/053-056-061 and No. 2001/005-042. CITES Secretariat, Geneva (www.cites.org).
- Anonymous, 2000c: Sturgeon and paddlefish: Two years after the entry into force of their inclusion in CITES Appendix II. *TRAFFIC Network Briefing* (www.traffic.org)
- Anonymous, 2000d: Doc. AC.16.7.2 Implementation of Resolution Conf. 8.9 (Rev.) ACIPENSERIFORMES. CITES Secretariat, Geneva (www.cites.org) pp. 1-114
- Anonymous, 2000e: Decision 11.58 Regarding the establishment of quotas for trade in Acipenseriformes. CITES Secretariat, Geneva (www.cites.org).
- Anonymous, 2001b: SC45 Doc. 12, 12.1 and 12.2 Significant Trade in specimens of Appendix-II species. CITES Secretariat, Geneva (www.cites.org).
- Anonymous, 2001c: FAO Fishstat. FAO (Food and Agriculture Organisation of the United Nations), Rome, Italy (www.fao.org).
- Anonymous, 2001d: Notification to the Parties No. 2001/079 United Arab Emirates: Recommendation to suspend trade. CITES Secretariat, Geneva (www.cites.org).
- Anonymous, 2001e: Notification to the Parties No. 2001/056 Implementation of Resolution Conf. 8.9 (Rev.), Recommendations of the Standing Committee. CITES Secretariat, Geneva (www.cites.org).
- Anonymous, 2001f: Social and Economic Situation in Azerbaijan (Summary Review), Caspian Environment Programme, Baku, January 2001, pp. 43.
- Anonymous, 2001g: CITES World, Official Newsletter of the Parties. Issue N° 8–December 2001 (www.cites.org)
- Andreasen, L., 1999: Captive propagation as a recovery tool for North American Sturgeon. In: Williamson, D.F., Benz, G.W. and Hoover, C. (eds.) *Proceedings of the Symposium on the Harvest, Trade and Conservation of North American Paddlefish and Sturgeon*, May 7-8, 1998, Chattanooga, TN. TRAFFIC North America/WWF, Washington, DC, USA. 121-129.
- Arlati, G., Grassi, A. and Granata, A., 1999: Restocking *Acipenser naccarii* in the Lombardy Region. *Proceedings of the 3rd International Symposium on Sturgeon*, 8-11 July 1997, Piacenza, Italy. Extended Abstracts . Population biology and management, *J. Appl. Ichthyol.* 15 (1999), 298.
- Beamesderfer, R.C.P. and Far, R.A., 1997: Alternatives for the protection and restoration of sturgeons and their habitat. *Environment Biology of Fishes* (Kluwer Academic Publisher), 48: 407-417.

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Birstein, V.J., 1993: Sturgeons and paddlefishes: threatened fishes in need of conservation. *Cons. Biol.*, 7, Pp. 773-787.

Bruch, R.M., 1999: Management and Trade of Lake Sturgeon in North America. *Proceedings of the Symposium on the Harvest, Trade and Conservation of North American Paddlefish and Sturgeon*, May 7-8, 1998, Chattanooga, TN. TRAFFIC North America/WWF, Eds: D.F. Williamson, G.W. Benz, and C. Hoover, Washington DC, USA. pp. 106-120.

De Meulenaer, T. and Raymakers, C., 1996: *Sturgeons of the Caspian Sea and the international trade in caviar*. TRAFFIC Europe. pp. iv+71.

Jackson, J.R., Van De Valk, A.J., Brooking, E.T. and Rudstam, L.G., In press: *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA.

Jenkins, R.W.G., 2001 (unpublished report): *Management and Use of Caspian Sea Sturgeons by the Islamic Republic of Iran*. Creative Conservation Solutions, Canberra, Australia, pp. 8. (referred to in Annex 14)

Kazimov, R., Palatnikov, G. and Mekhtiev, A., 2001(unpublished report): *Main processes of sturgeon breeding in hatcheries*. Institute of Physiology and Toxicology, Baku Azerbaijan, pp. 14.

Kelleher, K., 2000: *Proposal for a Management System for the Transboundary Fishery Resources of the Caspian Sea*. Caspian Environment Programme (TACIS), Astrakhan, Russian Federation, pp. 75.

Kuliev, Z. and Muradov, B., 2000 (unpublished report): Review of existing fisheries management and trade control measures for sturgeon in AZERBAIJAN. In: *Sturgeon Fisheries Management and Trade Control Measures in Effect in Selected Danube and Caspian Range States*, TRAFFIC Europe, Brussels, Belgium pp. 250 (see Annex 9).

Kynard, B., Suci, R. and Horgan, M., In press (a): Life-History Studies on Danube River Stellate Surgeon in Romania: 1998-2000. *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA.

Kynard, B., Suci, R. and Horgan, M., In press (b): Telemetry and tag return studies on Danube River sturgeons, 1998-2000. *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA.

Ludwig, A., In press: Genetic aspects of sturgeon management and conservation. . *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA.

Mason, P., 2001: An Economic Analysis of the Problem of Sturgeon Depletion in the Caspian Sea. *Environment Valuation Workshop*, Caspian Environment Programme (UNDP), Baku, 17-28 September 2001. pp. 30.

Parker, B.L. and Rein, T.A., In press: The contribution of tribal sturgeon fishers in the collection of population management data for selected Columbia River reservoirs white sturgeon populations. *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA.

STUDY ON THE SOCIAL AND ECONOMIC ASPECTS OF ILLEGAL FISHING IN THE CASPIAN SEA

- Quinlan, H., Huber, R., Mattes, B. and Fischer G., In press: Tribal stewardship and management of Lake sturgeon *Acipenser fulvescens*, in the Bad River, Wisconsin – a free flowing system. *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA, Poster paper.
- Rasmussen, J.L., 1999: What is MICRA and why does it work? *Proceedings of the Symposium on the Harvest, Trade and Conservation of North American Paddlefish and Sturgeon*, May 7-8, 1998, Chattanooga, TN. TRAFFIC North America/WWF, Eds: D.F. Williamson, G.W. Benz, and C. Hoover, Washington DC, USA. pp. 218-229.
- Raymakers, C., 1999: Trade in Sturgeons from the Caspian Sea. *Proceedings of the Symposium on the Harvest, Trade and Conservation of North American Paddlefish and Sturgeon*, May 7-8, 1998, Chattanooga, TN. TRAFFIC North America/WWF, Eds: D.F. Williamson, G.W. Benz, and C. Hoover, Washington DC, USA. pp. 149-161.
- Raymakers, C., 2000 (unpublished report): *Assessment of the Implementation of CITES Listing of Acipenseriformes*. TRAFFIC Europe. pp. 35 + 12 annexes.
- Raymakers, C., 2001a (unpublished report): *Sturgeon Fisheries Management and Trade Control Measures in Effect in Selected Danube and Caspian Range States*. TRAFFIC Europe. pp. 18 + 14 annexes.
- Raymakers, C., 2001b (unpublished): *Sturgeon reproduction centres and fisheries in the southern Caspian Sea, Iran 22 – 30 May 2001*. Trip Report. pp. 15 + 3 annexes.
- Roe, D., 2001: Community-based Wildlife Management: Improved Livelihoods and Wildlife Conservation. International Institute for Environment and Development (IIED), *Bio-Brief* No.1 April 2001. pp. 1-3
- Runstrom, A., Reiter, D. and Cox, d., In press: Lake Sturgeon (*Acipenser fulvescens*) on the Menominee Indian Reservation: An effort toward Co-management and Population Restoration. *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA.
- Schaffter, R.G., In press: The use of set-line survey to measure year class strength and predict future changes in the adult population of white sturgeon, *Acipenser transmontanus*, in the San Francisco Bay system. *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA.
- Secor, D. H., 2000: Restoration of sturgeons: lessons from the Caspian Sea Sturgeon Ranching Programme. *Fish and Fisheries* (Blackwell Science Ltd.) 1: 215-230.
- St. Pierre, R., 1999: Restoration of Atlantic sturgeon in the northeastern USA with special emphasis on culture and restocking. *J. Appl. Ichthyol.* 15 (1999), 180-182.
- Taverny, C., Lepage, M., Piefort, S., Dumont, P. and Rochard, E., In press: Movement of juvenile European sturgeon *Acipenser sturio* in the Gironde estuary. *Proceedings of the 4th International Symposium on Sturgeon, 8-13 July 2001*, Oshkosh Wisconsin, USA, Poster paper.
- Vaisman, A., 1997 (unpublished report): *Sturgeon Catch and Trade in the Russian Part of the Caspian Sea*. TRAFFIC Europe, pp. 21 + annex.
- Vaisman, A. and Raymakers, C., 2001: The Status of Sturgeon resources in Russia. *TRAFFIC Bulletin* 19, 1:33-44.

STUDY ON THE SOCIAL AND ECONOMIC ASPECTS OF ILLEGAL FISHING IN THE CASPIAN SEA

Zuzina, E. and Yuldasheva, E., 2000 (unpublished): Review of existing fisheries management measures for Sturgeon in the Caspian Sea: Report on the Russian Federation. In: *Sturgeon Fisheries Management and Trade Control Measures in Effect in Selected Danube and Caspian Range States*, TRAFFIC Europe, Brussels, Belgium pp. 250. (see Annex 9).