



Synopsis Inception workshop for the project
“Caspian Water Quality Monitoring and Action Plan for Areas of Pollution Concern”
Tacis/2005/109244
Venue: Nissa Hotel, Ashgabat, Turkmenistan; 17 and 18 May 2007

I. INTRODUCTION

This Workshop was organized by the DHV/COWI Consortium to discuss the findings of the Inception Phase for this project and to adjust the work plan to the needs and recommendations of the beneficiaries. The SAPIC of Turkmenistan helped prepare and realize the venue in Hotel Nissa in Ashgabat, excellently supporting the event in all aspects, including help with accommodation, translation, visa, transport, logistics, administration and visibility. The Workshop was attended by about 30 participants, including most of the SAPICs and PRAGs of the riparian states, the CEP Management from Tehran, representatives of the International Oil Industry along the Caspian, representatives of the Turkmenistan MNP, EcoCaspoControl and the port sector. The Turkmenistan Minister of MEP opened the Workshop on Thursday and attended final meetings on Friday. Representatives of EU and UNDP attended the opening as well and delivered welcome words. Television, radio and written press paid ample attention to the event.

II. OPENING SESSIONS

Mr. Makhtumkuli Akmuradov, Minister of Nature Protection of Turkmenistan expressed a warm welcome to the participants and expressed his gratitude to EU TACIS for enabling this event in Turkmenistan. He gave an overview of Turkmenistan’s ongoing activities for improving the environment in its Caspian coastal zone, articulating these efforts needs to be embedded in the CEP context as will be endorsed under the Tehran Convention. In this regard he referred to the First Convention of the Parties, CoP1, scheduled next week in Baku. He wished participants a good and fruitful event. The list of participants including their coordinates is attached to this synopsis.

Mr Young, UNDP Turkmenistan rearticulated the efforts UNDP, UNEP and GEF are making since 1995 in establishing a joint Caspian Environment Program (CEP). He reminded EU through TACIS has been involved from the very start and that this project will be a new opportunity where EU can give momentum to the pollution monitoring and action planning for the Caspian areas of pollution concern.

Mr. Michael Wilson, EU TACIS Turkmenistan welcomed the project in Turkmenistan and framed the initiative within the project completed already under TACIS. He expressed his gratitude to Ms Lena Nielsen Project Manager for this project in EuropeAid for enabling it; reminding short communication lines between Brussels and Ashgabat are kept-up. He reminded pollution control and action planning is an important aspect of improving the water quality of the Caspian, but in doing is, due attention has to be paid to another aspect: climate change! Exploring and exploration of the huge oil and gas fields along and in the Caspian not only is a risk for the aquatic ecosystem. The enlarged release of carbon dioxide into the atmosphere is a thread requiring counter measures. Carbon sequestering is not in the scope of this project, but the impact of climate change will affect all activities in the Caspian region, including monitoring and action planning. He stressed the present project should remind this.

Mr. Gijs Kok, Team Leader DHV/COWI Consortium (TL) expressed his gratitude for the excellent hosting of the Workshop by MNP and said personal words of thanks to the Minister, SAPIC, and other speakers. He welcomed all participants, especially the representatives of the oil industry and he wished the coming dialogue would enable the Consortium to find the right focus facilitated by a good road map.

He recalled the project is supported under the EU's neighborhood policy. This will enable Consortium seeking galvanized and harmonized solutions. In this regard the Project will build at the pillars of ECs neighborhood policies, by making the lighthouse function work, stimulating the regional policy dialogue and providing policy instruments and financial support, enabled by TACIS. In this regard he referred to the EU Water Framework Directive (WFD). The WFD is an example of a water policy instrument aiming at uniform standards, legally binding in a trans-boundary context, binding time frames with agreed infringement procedures, anchored in an economic framework demanding cost-effective measures; and supported by public participation, (http://ec.europa.eu/environment/water/water-framework/index_en.html).

He introduced participants to the program of the Workshop, articulating the Workshop is an opportunity for open discussion, where the agenda will facilitate the interaction between the parties.

TL explained Workshop arrangements:

- √ **Participants** introduced themselves
- √ **Mr. Vladimir Glazovsky**, Ministry of Nature Protection/ P-RAG Member for Turkmenistan was regretted. In his place Russian **Mr. Anatoly Krutov**, Consortium's short term expert for the Inception Phase, was appointed acting Chairman / Facilitator.
- √ **Mr. Dirkjan Douma**, Assistant Expert of Consortium was nominated treasurer.

III. PRESENTATIONS BY CEP EXPERTS

Mr. Hamidrezah Gaffarzadeh, CEP Manager, PCU, Tehran expressed this TACIS project is timely and needed to sustain activities that are already going on seven years. At the same time the TACIS Aid is flexible in its mandate. The CEP has addressed the pollution issues right from the very beginning in 1997.

During the First CEP Phase in 1998 in Ramsar it was agreed Caspian Regional Pollution Centers would be established in Baku and Iran. The Baku Center was helped by the EU; the Iran Center by UNDP. In the first Phase of CEP sediment samples were collected. The picture obtained did not really meet the expectation of what thought to be the situation. Possibly samples were not collected in a representative way and results did not show a trend.

In the Second Phase, the Caspian Regional Thematic Activity Centers for Pollution (CRCTs) were abandoned. In stead P-RAGs, Pollution Regional Action Groups were formed, to replace the CRCTs. The P-RAG is a consultative body on pollution control strategies, meeting twice a year. It is for the CoP1 to decide the P-RAGs can continue. P-RAG's institutional arrangements are in place:

1. A Regional Water Quality Monitoring Program, RWQMP was agreed upon, delineating how to sample, where to sample, etc
2. A work plan for pollution action planning was agreed, supported by protocol for land-based pollution sources.

We must assure that what has been assured will not be lost and that the results obtained are transferred to the CoP.

CEP2 will come to an end in this year. It is GEF to decide if there is a Third Phase for CEP. The Caspian is interesting: oil and environment, but GEF also says, the region is not poor. It sometimes is said, "We do not

need the money; we need the dialogue". Whoever submits the money, the problem always is how to spend it the best possible way. Is it pollution, fisheries, invasive species, coastal zones, etc?

The perspective is we have to find common ground. Not to redo what we have done, but to fill in the gaps and to add those aspects that are needed, additionally. If the Consortium works into this direction, the CEP aspects the results project will be very concrete and very useful.

Mr. Reza Sheikholeslami Pollution Expert, PCU, Tehran, presented CEP-II Regional Pollution Related Activities in the Caspian Sea.

Related Pollution Activities include:

1. Review Study on the *Status of Pollution Information/Institutions* in the Caspian Region;
2. Assistance in the design, promotion and implementation of a cost effective and affordable regional monitoring program;
3. Carrying out an *inter-calibration exercises among Caspian States Laboratories*, for POPs/PTS measurements;
4. Preparation of a *common guideline for sediment sampling and pollutant analyses*;
5. In conjunction with the oil industry develop an environmental rapid assessment methodology/program using *bio-marker techniques*;
6. Further surveys of the coastal sediments, assessing the impact of key transboundary contaminants;
7. Surveys of major contaminants in Volga Delta and Kura River;
8. *Rapid Assessment of Pollution from Land Sources* in Near Caspian Watershed;
9. Development of *Regional Action Plan* for addressing the activities contributing to transboundary PTS contaminants;
10. POPs Pilot Projects for Control/Reduction/Elimination of POPs in the region;
11. Desk Study on *Contamination of Certain Caspian Rivers*;
12. Activities in relation to *Anomalous Algal Bloom* in Southern Caspian (AAB).

Ad 1: The Review Study on the Status of Pollution Information/Institutions in the Caspian Region was based on a *Questionnaire* filled-in by the Caspian states (2004) including:

- √ *Responsible organization for Contaminant Monitoring*;
- √ *Laboratories activities on contaminant measurements*;
- √ *Specialized institutions/laboratories involved in eco-toxicity and biomarker technique application in contaminant monitoring and assessment*;
- √ *Responsible organizations for Monitoring of Pollution sources and control*;
- √ *National POPs and PTS related activities in connection to the Caspian Sea*.

Ad 2: The Assistance in the design, promotion and implementation of a cost effective and affordable regional monitoring program was delivered. PRAG (IV), was held in Baku, 11-13 October 2005, the meeting collectively agreed on the elements and structure of a Regional Pollution Monitoring Program in the Caspian Sea. Major elements are:

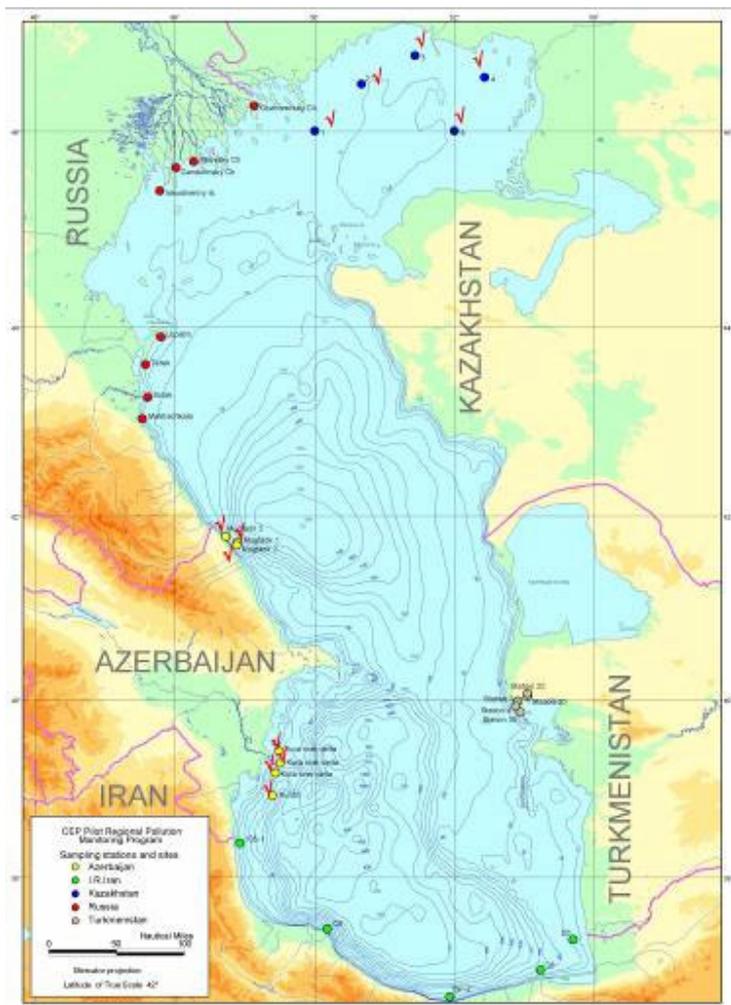
- √ *Sampling media: bottom sediments of coastal waters*
- √ *Contaminant parameters: DDT, Lindane, TPH for Organic Compounds and Hg, Cu, Zn for Trace Metals*
- √ *Complementary parameters: grain size, TOC, Al, CO₃ and Fe*
- √ *Number of stations: 5 – 8 in each coastal waters of country*
- √ *Sampling frequency : once a year*
- √ *Timing: the same period all over the sea, suggested July – September.*

- ✓ Using common guidelines for sampling, sample handling, sample preparation and analyses

Following institutes were involved:

- ✓ Azerbaijan: Caspian Complex Environmental Monitoring Administration (CEEMA) of MENR
- ✓ I.R. Iran: Department of the environment, Marine Environment Bureau
- ✓ Kazakhstan: Kazhydromet
- ✓ Russia: SOI, Roshydromet
- ✓ Turkmenistan: Caspoecontrol

The position of the RQWMP sampling stations were chosen as follows:



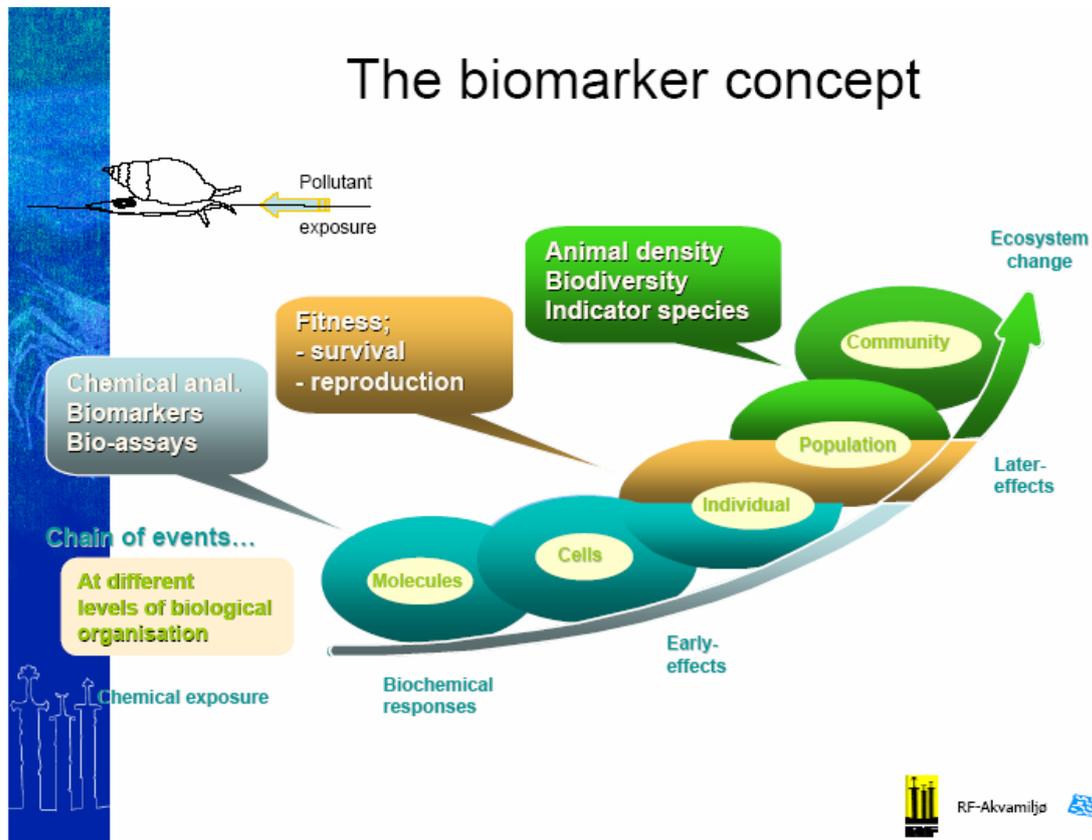
Ad 3: The outcome of inter-calibration exercises among Caspian States Laboratories for POPs/PTS measurements were as follows:

- ✓ Proficiency test (Metals, PCBs and CPs) has been conducted among the laboratories in the region, supported by MESL/IAEA-Monaco to assess the capability of local laboratories;
- ✓ The results have shown that only limited numbers of local nominated laboratories performances were satisfactory in measurements of certain metals;
- ✓ None of nominated laboratories performances were satisfactory in PCBs and CPs measurements.

Ad 4: A common regional guideline was developed for monitoring of POPs/PTS in sediment including sampling, sample handling and analyses in cooperation with MESL/IAEA-Monaco.

Ad 5: In conjunction with the oil industry an environmental rapid assessment methodology/program using bio-marker techniques is being developed. A Scientific workshop was held on application of Biomarker Technique in environmental monitoring and management, 21-23 February 2005, Baku with focus on new techniques that potentially could be applied in contaminant monitoring and assessment particularly in oil fields operations. A brief introduction to some of the biomarker techniques was also presented to the participants at the Caspian Laboratory in Baku.

An illustration of the technology was presented:



Biomarkers refer to any biological response in a living organism resulting from the exposure to a pollutant chemical (chemicals). Biomarkers sometimes are confused with a term used for organic chemical markers (e.g. persistent components in oil, such as pristane, phytane, and hopane, etc).

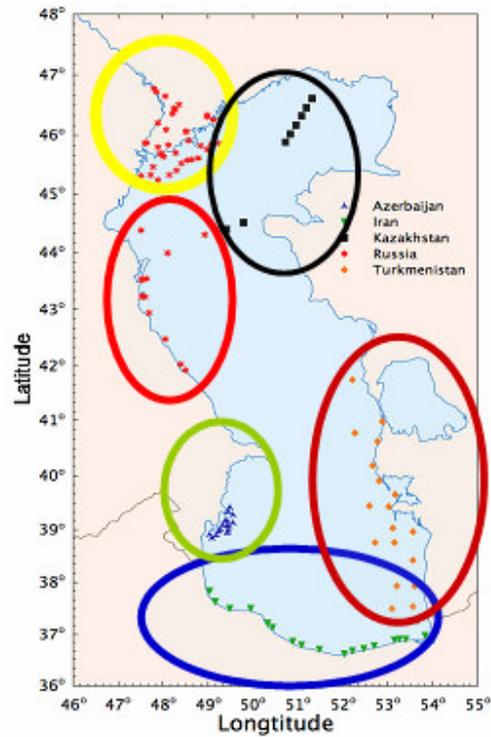
The biomarkers are defined as biochemical, cellular, physiological or behavioral variations that can be measured in tissue or body fluid samples or at level of the whole organism, providing evidence of exposure to and/or effects of one or more chemical pollutants, [Depledge, M].

Ad 6: Further surveys of the *coastal sediments*, assessing the impact of key transboundary contaminants were implemented:

Surveys of Major contaminant: (2005 Caspian Scientific Cruise)

A total of 74 duplicated sediment samples were obtained for PTS analysis including:

- AZ:** 16 samples
- IR:** 19 samples
- TK:** 18 samples
- RU:** 13 samples
- KZ:** 8 samples

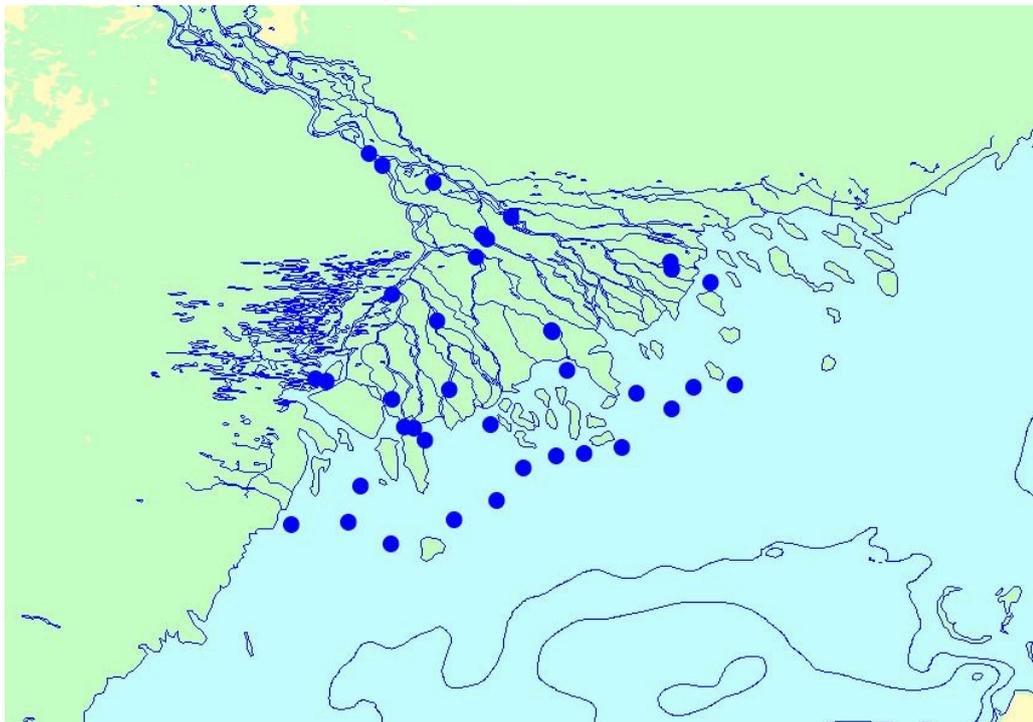


- a. **Surveys of Major contaminant: 2005 Kura River Contaminant Survey.** Surveys obtained 12 Suspended Material (6 in June and 6 in August) and one bottom sediment samples:



Fig. 1 Distribution of Kura-Arax river system in related countries and sampled stations on Kura River in Azerbaijan Republic in June and August

- b. **Surveys of Major contaminant: 2005 Volga Delta Contaminant Survey.** From 30 stations, 24 sediment samples were obtained from Volga delta:



Ad 7: Rapid Assessment of Pollution from Land Sources in Near Caspian Watershed. The *GIWA methodology* <http://giwa.ico3.com/giwa/index.html> was used to prepare point and non point sources inventory and a one day training workshop was held in Baku to introduce the GIWA model.

Ad 8: Development of *Regional Action Plan* for addressing the activities contributing to transboundary PTS contaminants (RPAP): The Action Plan (RPAP) for Caspian Region was developed by the international consultant Ms.Katarína Magulová and close cooperation/collaboration of 5 national consultants in 2006.

Ad 9: The Development of Regional Action Plan for addressing the activities contributing to transboundary PTS contaminants (RPAP) included:

- i. Action program to prevent illegal use and trade with POPs pesticides;
- ii. Action program to clean up stores of obsolete POPs agrochemicals located in the near Caspian region and ESD of the obsolete stocks;
- iii. Action program to clean up sites contaminated with PTS having major potential to pollute the Caspian Sea
- iv. Action program to raise awareness about potential hazards due to PTS in the general public (use of agrochemicals, entering POPs stores/contaminated sites uncontrolled burning of waste, etc.)
- v. Action program to establish infrastructure for environmentally sound storage and destruction / disposal of POPs;
- vi. Action program to prevent / mitigate impact of large oil spills from exploitation, transport, processing and accidents;

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- xi. Action program to establish infrastructure for environmentally sound storage and destruction / disposal of POPs;
- xii. Action program to prevent / mitigate impact of large oil spills from exploitation, transport, processing and accidents; and
- xiii. Ad 10: POPs Pilot Projects for Control/Reduction/Elimination of POPs in the region.

Ad 10: POPs Pilot Projects for Control/Reduction/Elimination of POPs in the region include:

- √ **Azerbaijan:** "Clean up of the territory of warehouse base for poison-chemicals of the Sali district and reburial of the POPs." Grantee: SHAFA-I Ltd., Baku;
- √ **I.R.Iran:** "Application of insect sex pheromones and appropriate pesticide application techniques in order to reduce the pesticide residues on rice in paddy fields and the environment in Mazandaran Province". Grantee: Biocontrol Research Laboratory - PPDR - Amol.;
- √ **Kazakhstan:** no study launched because low use of POPs;
- √ **Russia:** "Development and introduction to technologies and mobile pilot model of the installation for utilization of agricultural pesticides by method of thermal destruction". Grantee: The Institute of Social-economic Strategic Monitoring.;
- √ **Turkmenistan:** "Sustainable (POPs-free) development of agricultural activities through the introduction of POPs free technologies of plant protection and training of local farmers". Grantee: Communal Services of Essenguly Etrap;

Ad 11: Desk Study on *Contamination of Certain Caspian Rivers*. In general, in flowing studies, there are lacks of data on contaminant, and the quality of available data is poor, e.g:

- √ *Collection of the existing contaminant data and information on Volga, Terek and Ural rivers; and*
- √ *Collection of the existing contaminant data and information on Sefidroud River in Iran.*

Ad 12: Activities in relation to *Anomalous Algal Bloom* in Southern Caspian (AAB): September 2005 experienced unprecedented bloom Anomalous Algal Bloom-(AAB) in the Iranian coast. Large algal bloom of such scale was never observed before in open waters of the Southern Caspian. The *Nodularia* was identified as responsible specie for the bloom.

- √ *Remote sensing researches were carried out by Marine Hydro-physical Institute of Ukrainian Academy of Sciences. AAB on MODIS satellite images: a) August 17, 2005 b) September 1, 2005 illustrate it. Chlorophyll-a and WLR412 concentration maps for September 01, 2005 deliver additional information.*
- √ *Field investigations were undertaken by IFRO supported by CEP, August-September 2006.*

Conclusions on Monitoring:

- √ **In general, the region suffers from lack of reliable contaminant data particularly on POPs / PTS in order to have proper assessment. Unfortunately the data on other types of contaminants or parameters also is weak;**
- √ **At present, the member states are not at the situation that can effectively implement the regional monitoring. Their national monitoring plan clearly indicates this status. The main reason/or root cause is that there is no well defined/ users or demand for the output of the monitoring. (there is no proper link between monitoring and environmental management);**
- √ **The performances of Local laboratories in the region for PCBs and CPs are not satisfactory;**
- √ **Investigation needs to be continued for improving the assessment and understanding of contaminant changes and trends in Caspian Sea;**

- √ **Quality of the contaminant data needs to be cross checked by internationally qualified Laboratory/laboratories. More cooperation/collaboration of Caspian countries in this Connection Is highly necessary;**
- √ **Application of Biomarker Technique particularly in monitoring of oil field and capacity building of the region in this connection could be recommended.**

IV BRIEFS BY SAPICs AND PRAG MEMBERS

Azerbaijan: Mr. Mirsalam Ganbarov, Head of the Caspian Complex Environment Monitoring office and Mr. Mammadhuseyn Muslimov, Head of National Monitoring Department.

The water quality of Azeri's coastal area is an issue of great concern. Oil and gas extraction and processing are wide spread, ship-building is booming; sewage outfalls are still not remediated, but sanitation plans are in place and to be implemented in 5 years. Abcheron Peninsular is a very serious problem. An action plan was developed September 2006:

1. Identification of hotspots
2. Areas with leakage and spillage
3. Vessel remains
4. Waste dumps
5. Improved ecological legislation
6. Expansion of national park's area.

Azerbaijan's 900 km of coastline has more than 300 land-based pollution sources, which have been listed. Pollution loads assessments have been partially completed. There is no "Polluters pay mechanism" in place yet; the law to be adopted. There are 6 research vessels, some with deep water winches available. **Mr. Oleg Voitsekovytsch, Water Quality Monitoring Expert Consortium (KE2)**, requested details on tonnage, power, winch capacity etc. These will be answered forthcoming visit. TL reminded oceanographic survey data are yearly published in Russian.

Islamic Republic Iran: Ms Parvin Farshchi, SAPIC/ I.R.Iran: The subjects demanded in the program are at a too high level of detail. Mr. Reza Sheikholeslami's presentation is a good synopsis. What SAPIC wants to add are:

1. The relation between pollution and health is not understood, yet;
2. Recreational water quality is the issue of concern for the Iranian Coast;
3. River fluxes need to be identified;
4. Land-based sources to be identified;
5. Ballast problems need urgent attention;
6. Risk assessment is neglected at large;
7. No regulation as yet for POPs and PT;
8. WB to finance POPs and PTS initiatives in IR Iran. .

The presentation of Ms Parvin Farshchi, SAPIC/ I.R.Iran (see web-site) offers detailed information on the actors and programs engaged in the CEP in IR IRAN::

- √ Organizations/Institutions
- √ Main Laboratories, including an overall evaluation:
 - Laboratories are in possession of good infrastructure for different contaminants, specially for organic and inorganic substances
 - Availability of Expertise: Not involved in routine monitoring of contaminants and mostly project oriented;
 - QA/QC needs improvement; Limited Inter-calibration Exercise;
 - No systematic contaminant monitoring in terms of POPs and PTS;
 - POPs Enabling Activity is at its early stage and only Inventory of POPs completed
- √ Laboratories Involved in Eco-toxicity and Biomarker Techniques Application in Contaminant Monitoring and Assessment
- √ Recommendations: RPAP is suggested to include:
 - *Biota as another media for sampling and analysis of targeted contaminants and ecotoxicological studies*
 - *Recreational water monitoring to include Microbial Pollution and Eutrophication*
 - *Assessment of Interrelationship between Pollution and Human Health*
 - *Monitoring of Harmful/ any Algal Bloom*

In discussions, **Mr. Vladimir Markov, Deputy Director of the Russian Centre for International Projects** questioned about above point 9. **KE2** suggested paying attention to impact of sea level fluctuations relations and impact of atmospheric deposition.

Russia: Mr. Alexander Korshenko, State Oceanographic Institute, Head of Marine Pollution Monitoring Laboratory presented the situation for the regional laboratories in Russia:

1. The Astrakhan Center on Hydrometeorology monitored about 40 stations in the Northern Caspian 1978-1992. Standard Hydrochemistry included Nutrients, Total Petroleum Hydrocarbons, Phenols and Ammonium.
2. Occasional Scientific Cruises and Projects are executed since 1992.
3. Dagestan's Coastal Waters are monitored since 2006. In October 2006 these 36 Stations included Surface & Near bottom layers in the depth zone of 4 - 24 m relative to Caspian Sea level. They cover 8 spot locations and the transect ion Chechen-Mahachkala
4. Standard hydrochemistry includes Temperature, Salinity Alkalinity, pH, Oxygen Saturation, Total-Phosphate, Silicates, Nitrites / Nitrates / Ammonium / Total-N;
5. Pollution includes Detergents, Total Petroleum Hydrocarbons, Phenols, Cu;
6. The Astrakhan and Dagestan Hydrometeorology Centers are the principle laboratories. Astrakhan has boating facilities to investigate the river; Dagestan has two ships plus analytical capacity. The Dagestan Center has demonstrated some data processing and data presentation capacity, reflected in water quality isopleths for the Yalama – Samur River.

Turkmenistan, Ms. Gozel Orazdurdyeva, SAPIC explained the concerns for pollution of sea water, soil, groundwater around Turkmenbasy Bay and the port of Cheleken. The first concern oil refineries, the second oil transport. Contingency planning and emergency response planning are under developed and an adequate risk assessment for incidents, accident and major catastrophes is missing. Typical examples are:

- √ Turkmenbashi Oil Refinery (TOR)
- √ Khazar Chemical Plant (KhCP)
- √ Exploitation and extraction in the coastal area (concern Turkmenoil and other companies)
- √ Offshore oil extraction ("Dragon oil" company)
- √ Transportation and delivery of oil and oil products (Turkmenoil, Turkmen Marine and River Lines, TOR)

The CaspoEcoControl laboratory in Turkmenbasy is lacking adequate equipment and training. There is a sincere need for upgrading equipment and capacity building. The research vessel is being refurbished.

Typical national measures envisaged include:

- √ Strengthening pollution monitoring;
- √ Promoting pollution reduction;;
- √ Pollution prevention during oil transportation;
- √ Collection/utilization of oil products and other industrial wastes;
- √ Pollution prevention from sewerage
- √ Strengthening oil spill response

Ecology of the Caspian – its Priorities – The problem of pollution and its solution:

- √ TDA – identification of the transboundary problems, detailed cause –chain analyses. Pollution is one of main priorities today.
- √ SAP – actions for solution of this problem were identified together with other problems actions as a whole on the region

- √ NCAP – national environmental issues were identified and actions for their solutions with time framework were pointed

References to built on are:

- √ Ecotoxicity Study in the first CEP phase;
- √ Sea-Cruise - 2005. (Assessment of key transboundary pollutants in water and sediments in the whole costal zones of the Caspian)
- √ RPAP- Regional Action Plan on Persistent toxic substances (PTS)
- √ Rapid Assessment of Pollution Sources (RAPS)
- √ National pollution monitoring program – contribution into Regional Pollution Monitoring Programme (PRPM)

In general discussions, **Mr Markov** addressed the definition issues, demanding a glossary, notably in Russian language. The proper citation if the Tehran Convention was another issue brought to attention of TL.

V. CONTRIBUTIONS BY THE OIL INDUSTRY:

Mr. Phillip Jones , (London, UK) Agip Consortium Kazakhstan, Environmental Monitoring Engineer

Mr Jones reflected on KCO's data bases collected since 1993 complemented by AGIP surveys, starting in 2001. AGIPs monitoring mainly focused on baseline data collection for supporting EIAs for oil exploration.

AGIP established commitments for water quality monitoring, mostly based on in-situ equipment measuring salinity, dissolved oxygen, pH, turbidity and chlorophyll. Other parameters analyzed in the laboratory concern N, P and Si components, trace metals and hydro carbons.

Since 2005 AGIP is making proficiency testing for Kazakh laboratories. QA/QC is promoted by preparing a Common Quality Assurance Manual. Laboratories contracted by AGIP do have to comply with this. The traceability of results now is strongly being enhanced. Further steps are underway to assure the quality of data.

Nevertheless, the Kashkam oil field is very large and monitoring results reflect snap shots. Chlorophyll now for example is observed with satellite images, offering a complete picture for the ice bound and ice free parts of the Northern Caspian. Still the need for collecting ground truth data exists and logistical conditions are not simple.

AGIP is investigating more advanced methods for continuous monitoring and data logging, for example for nutrients, meeting the usual constraints. The scope for continuous monitoring is fairly limited. Biomarkers are considered as well as application of a muscle watch system.

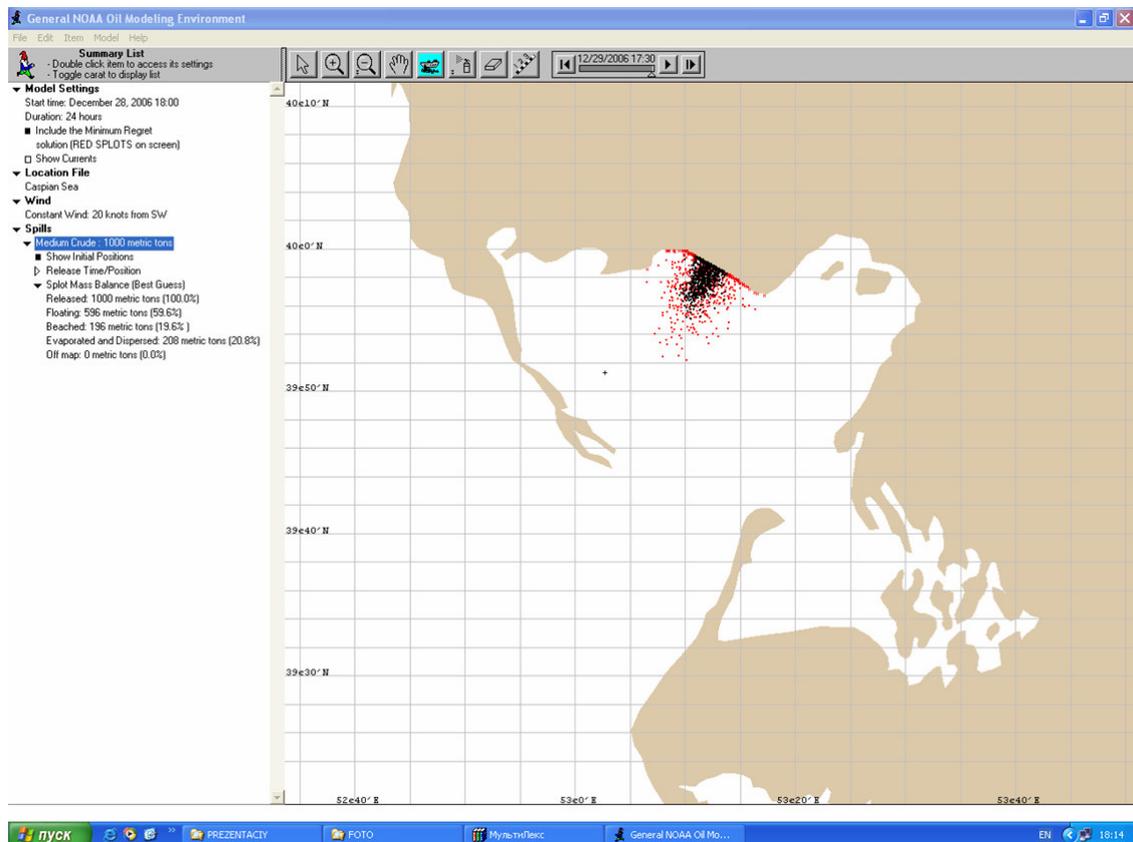
Mr. Kasimov Yu. Dragon Oil, Turkmenistan

DRAGON Oil collects data on surface water, seawater and sediment, basically to cover the baseline data demands of EIAs for oil exploration and exploitation purposes. The data do not show the company is doing something wrong. Severak surveys have been made. Sampling is positioned using satellite images. These are annotated land based pollution sources, for example those affecting Turkmenbashy Bay. In the past much waste was disposed in the Bay. Now the situation has improved. The presentation was illustrated by a nice slide show, showing the peaceful coexistence of oil industry and nature.

Mr. Barsuk N., EMEROL LTD. Ireland, Turkmenistan branche

GIS based information systems provide a fair understanding of the impact of petroleum industry activities. Modeling also has provided further understanding. Now between 75% and 90% of all information used every day is GIS-based, providing a spatial picture of impacts. Oil drift models offer a complementary tool for tracing the trajectory of incidental oil spills. A typical example of mass balance modeling was presented, showing the impact of oil spill modeling at the Turkmenbashy Bay, with mass balance. In compliance with the Aarhus Convention data are published on a website, referred to as the: "Caspian Response Resource List". This displays names of providers of applied methods, like the USGS, US Coast Guard, US EPA, US-Defense, etc.

Example of mass balance model predicting impact of oil spill

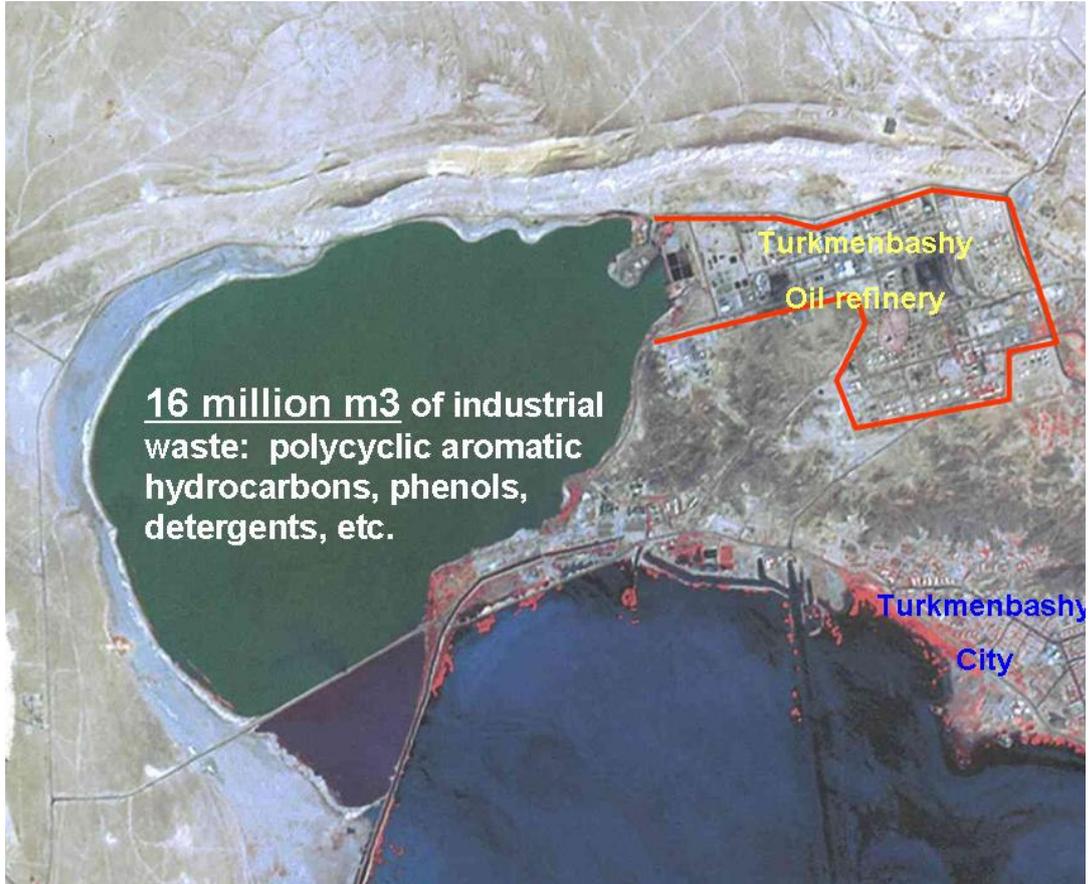


Saimonov Bay receives 100,000 tons of oil each year. Emphasis is on measuring the impact by TPH (Total Petroleum Hydrocarbons), copper and phenols.

- ✓ Lenses of free liquid oil waste have been formed above the groundwater table, so-called “Free Oil Contaminants” (FOCs). Such lenses have been formed under the TBR, the Ufra transshipment tank farm, along large oil- and product pipelines, and at other place. They result from leakage and incidental pollution and are a threat to seawater and the drinking water supply.
- ✓ In **Grozny Refinery** hundreds thousand tons of oil products have accumulated in the lens floating at the groundwater table. Now oil wastes combined with river water are discharging at the Caspian Sea and its unique biological resources are threatened with an ecological catastrophe.

Turkmenbashy refinery has always used the Saimonov Bay as a point of final discharge of industrial liquid wastes and sewage.

- ✓ Now Saimonov Bay contains more than 16 million m3 of a mixture of brine, sludges, hydrocarbons including most dangerous polycyclic aromatic hydrocarbons, bitumen, asphaltens, gums, synthetic organic compounds, sulfur-organic and chlorine-organic compounds, heavy metals, phenols, detergents, feces, virulent bacteria, etc. Photo and gas spectrometry are used to analyze the leachates. EcoCaspoControl is a partner in this.
- ✓ In the area of Saimonov Bay the streams of liquid oil waste discharge directly at the coast. Currently at the eastern coast of the Saimonov Bay many cases of oil waste seepage are observed, about 2 km of the coastline is strongly polluted with heavy oil. The volume of liquid oil waste accumulated in the Bay in 1999 from industrial discharge of TBR was approximately 70-140 ton, and combined with drain of subsoil water – 6 000 ton (almost a hundred times greater!) As a result, the content of oil waste in water of the Bay reaches 5-12 ppm.



Development of environmental norms and standards, Impact assessment (EIA)

At the coastal zone of Turkmenistan now an ambitious construction is under realization. The tourist complexes are creating (hotels, restaurants, and recreation centers), modern roads are laying, port facilities are reconstructing, power stations, desalinization plants and boilers are constructing. Current environmental permits of existing and new enterprises and entities are obsolete, and Environmental abstracts of projecting documentation for new objects under construction very often are not matching to modern requirements. This situation demands special scientific research for development of unified environmental norms and standards and draft projects for:

- √ Contamination sources inventory;
- √ Maximum permitted emissions;
- √ Maximum permitted discharge;
- √ Maximum permitted quantity of solid waste;
- √ Statement on Environmental impact assessment

VI. PRESENTATION OF THE DRAFT INCEPTION REPORT:

Introduction of the Project by TL

With reference to the presentation at the website, TL rearticulated the project objectives:

- √ The broad overall objective is to improve quality of the marine and coastal environment of the Caspian Sea through the Caspian Environment Program (CEP)
- √ The project purpose is to assist in achievement of
 - *Target 2.1 (Regional Water Quality Monitoring Program - RWQMP) and*
 - *Target 3.2 (Regional Pollution Action Plan - RPAP) of Environmental Quality Objective III (Improve Caspian Water Quality) of the Strategic Action Program (SAP) for the Caspian.*

TL reiterated the amended project objectives:

SAP Target 2.1 of November 5, 2003, now converted per October 2006 into

- √ *Target 3.1: “Develop and implement a regional water quality-monitoring Program focused on critical contaminants and hotspots, (H) 1-5 years”; and*

SAP Target 3.2 of November 5, 2003, now converted per October 2006 into

- √ *Target 1.2: “Undertake a comprehensive land-based source assessment and develop a regional action plan to remediate areas of pollution concern identified, (H) 1-5 years”.*

TL recalled the Tasks and Activities proposed by the Consortium in response to the ToR:

- √ Task 1: Project Management and Reporting
 - Project cooperation and communication
 - Preparation of the Work Plan
- √ Task 2: Collection of existing data and identifying main pollution sources (added by Consortium)
- √ Task 3: Design and implementation of an enhanced RWQMP
- √ Task 4: Deployment of equipment and procurement of vessels and samples analysis for four RWQMP cruises
- √ Task 5: Production of RPAPs

In regard of the preparation of the Work plan, the SAPICs and PRAGs highlighted the need to very carefully consider the recommendations made in this Inception Workshop and to be modest in water quality modeling efforts.

TL elaborated Tasks briefly, making reference to the proposal, and explained the procedures for recruiting local experts. SAPICS agreed to limit the number of experts and agreed with TLs proposal to work on the basis of assignment notes, based on an performance based input output approach, backed by time sheets.

The proposal for using small boats for sampling near shore water quality was positively received, though the use of deep water vessels for sampling deeper water was not excluded. Prerogative is to have a clear picture of the nature and extent of the polluted zones. The extents of these zones often are revealed from the air. Satellite images can be very useful for identifying these zones.

Key Expert no 2¹: Water Quality Monitoring Mr Oleg Voiitsekhovitch in cooperation with KE3 Environmental Expert, Mr Jan Høybye / COWI Denmark (regretted), presented building bricks for a water quality-monitoring program focused on critical contaminants and «hotspots»

In response to the amended project objectives, KE23 emphasized:

- √ This conversion prompts the Consultant to put more efforts in identifying and mitigating land based pollution sources that affect the Caspian Sea.
- √ Rather than GIWA (Global International Water Assessment), the Consultant therefore suggested applying OECD's DPSIR (Driver, Pressure, State, Impact and Response) approach both to RWQMP and RPAP.

However due attention will be given to the existing information as presented in the sheets. See overview consulted documents.

Not all hot spots can be covered in present projects. A possible priority setting was suggested:

Azerbaijan Baku Bay and Absheron Kura River Sumgait	(A1) (A-2) (A-3)	Oil product municipal, BOD NORM, Nitrogen Pesticides, (DDTs), PCBs, Heavy metals
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¹ In cooperation with Key Expert 3, Jan Agerholm Høybye, Environmental Expert who was regretted.

Iran Sefid Rood River Bandar Anzali Chalus/Noshahr Gorgan Bay	(I-1) (I-2) (I-3) (I-4)	Municipal waste water Industrial impact (heavy metals) CPs, PCBs
Turkmenistan Krasnavodsk Chelekan	(T1) (T2)	Municipal, Heavy metals, NORM
Kazakhstan Ural River del Aterau Aktau	(K1) (K2) (K3)	Oil and oil products Heavy metals, PCB,s
Russia Derbent (Terek) Makhachkala Volga River delta	(R1) (R2) (R3)	Oil product municipal, BOD, Nitrogen NORM, Pesticides, (DDTs), PCBs, Heavy metals

This strategy will serve the two main purposes of the current project:

- √ To address the most significant pollution sources (main objective for the RWQMP and RPAP); and to demonstrate how amelioration projects can be designed for the various key types of pollution (RPAP). These demonstration activities will provide the basis (handbook, methodology guidelines) for CEP's further work.
- √ CEP is already carrying our rather wide monitoring activity at the Caspian Sea (RPMP). Therefore RMQP and RPMP must be well harmonized and coordinated.

The main issues to be considered as a part of studies in justification of RWQMP are:

- √ Inflow and water level data
- √ Water quality data and Bottom sediment contamination and its adsorption capacity and contaminants remobilization
- √ Sedimentation fluxes
- √ Specific "Hot spots" and impact area identification
- √ Monitoring data feedback and Data exchange
- √ Status of laboratory conditions and needs identification
- √ QA/QC status in national laboratories, identification of the key reference laboratories for Proficiency testing exercises
- √ Concept of the Database
- √ Models validation and Model utilization as a tool for RWQMP optimization.

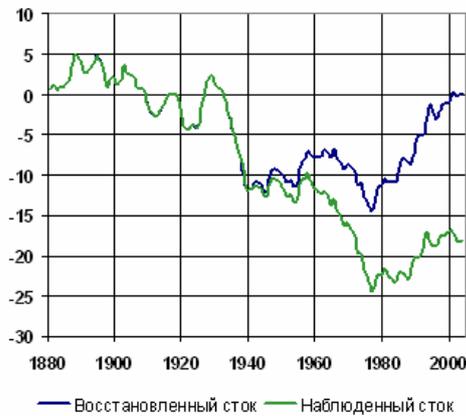
Water balance drivers:

- √ The main drivers of the Caspian Sea are Volga River, Precipitation and Evaporation.
- √ Evaporation is essentially the only mechanism transporting water away from the Sea
- √ Inflow to the Caspian Sea is dominated by precipitation and river discharge from Volga, which in total accounts for more than 90%.

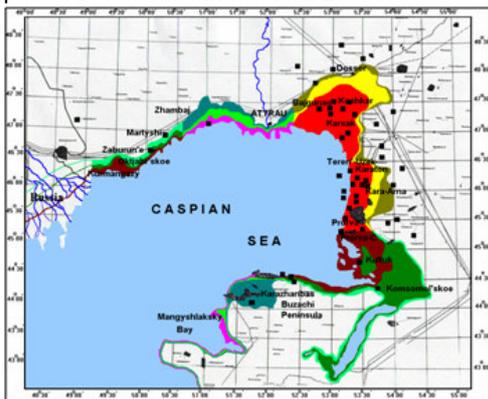
Important note: Volga River is main water flux contributor. It is not a fact that Volga is a major contributor of the pollution loading in to the Caspian Sea.

The Caspian Sea water level dynamics and Pollution concerns:

Long-term trends: driven by the climate and the human interventions (water extractions and dam construction and operation):



Short-term Storm Surges: During Surges the water level for the short period (some hours) can increase to 1,5 - 3,0 m. MIKE-21 may be successfully applied for diagnostic analyses of the impact of the potentially polluted territories and coastal zones



Examples are: flooding of the Tengiz depot area (2003) and Karaton-Teren' Uzek, agriculture lands washout. November 2004.

Identification of the Main Impacts on Water Quality is one of the most important tasks for RWQMP:

- √ Sources
- √ Source functions
- √ Impact area
- √ Criteria for Impact Assessment
- √ Critical impacts and their drivers
- √ Critical pathways
- √ Seasonality
- √ Long-term prediction

Pragmatic approach based on:

- √ Regional screening and
- √ "Hot spot" focused RWQMP strategy

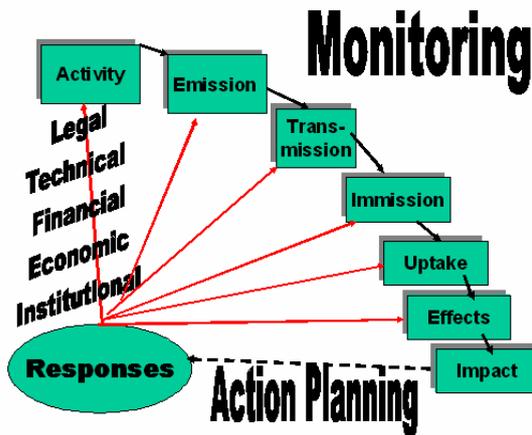
During recent years the number of Caspian Sea pollution Studies have been carried out. They provide a good basis for the analyses:

- √ Oil products in water
- √ POPs and PTS in water and sediment;

Available data suggest:

- ✓ The largest Nutrients pollution source is the rivers from the Russia (Volga River)
- ✓ The second largest source of pollution comes from municipalities (Iran, Azerbaijan).
- ✓ 70% of the oil pollution originates in Russia (via rivers) and coastal industrial activities in Azerbaijan, Iran and Kazakhstan (?)
- ✓ DDT, PCBs - comes mainly from Kura River and Iranian Coast

It will not be possible to pay full attention to all APCs and all problem areas during the present project; rather monitoring efforts will be concentrated to areas where there is a concerted response envisaged, based on the DPSIR methodology:



The Concept of the new RWQMP for the Caspian countries will be developed by discussing, presenting and proposing appropriate methodologies for:

- ✓ Monitoring selected Areas of Pollution Concern;
- ✓ Mapping and estimation of major pollution sources; and
- ✓ Develop Proposals for typical/demonstration pollution control and remediation actions/feasibility studies.

This strategy will serve the two main purposes of the current project:

- ✓ To address the most significant pollution sources (main objective for the RWQMP and RPAP); and
- ✓ To demonstrate how amelioration projects can be designed for the various key types of pollution (RPAP). These demonstration activities will provide the basis (handbook, methodology guidelines) for CEP's further work.

CEP already is carrying out rather wide monitoring activity at the Caspian Sea (RPMP). Therefore RMQP and RPMP must be well harmonized and co-coordinated.

In this regard **distinction** has to be made between:

- ✓ *Baseline monitoring already provided by national Services; and*
- ✓ *Specific monitoring for RWQMP to be provided under this TACIS project.*

The **baseline monitoring** concerns:

- ✓ River Water inflow
- ✓ Regular Hydrological and Oceanographic observation (level, water balance, water mass exchange, water dynamic, water dispersion, ventilation,
- ✓ Physical parameters (CTD profiles)
- ✓ Hydrochemistry (pH, salinity, transparent, conductivity)
- ✓ Basic Hydrobiology (chlorophyll, phyto- and zoo plankton)
- ✓ Others

The **specific monitoring** objectives are:

- √ To identify the major sources of sea water and bottom sediment pollution and also its impact areas for the main regionally important pollutants based on its regional environmental risk potential and DPSR approach;
- √ To demonstrate the comparability of the monitoring data and to implement QA/QC program at the Caspian Sea countries;
- √ To validate the modeling tools to be chosen for simulation of the temporal and spatial dynamic of the contaminants in the sea water;
- √ To develop proposal for optimal (cost effective and informative) national and regional WQMP, which will make possible to monitor the current state of Environment, to justify and estimate Effectiveness of the SPD implementation.

QA/QC – Quality Assurance/Quality Control:

- √ Quality assurance is an integral part of the baseline and source oriented monitoring programs.
- √ Quality assurance should provide a replicable approach enabling comparison of results of different campaigns, both for different countries, different regions and different years or seasons.
- √ The first Proficiency testing (Metals, PCBs and CPs) has been conducted under supervision of MEL IAEA. The Reference materials concerned components like BS-1(OC) for PCBs and CPs and IAEA-405 (about 30 metals);
- √ AGIP initiated and carried out number of inter comparison working with Oil/Gas monitoring sector in Kazakhstan;
- √ The results show that it is still a beginning of the way toward QA/QC implementation in the most of Caspian countries.

Reference: <http://www.iupac.org>

Metrological traceability is an important point:

- √ **Comparability:** to provide confidence that measurement results agree within the stated methodology, regardless the time, place and laboratory;
- √ **Traceability:** to assure results of analysis can be related to the stated reference, usually national or international standard;

Examples of such standards are: VIM 6.10 – ref: BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, International Vocabulary of Basic and General Terms in Metrology, 2nd edition, Geneva, 1993).

Specific methods are needed to measure sediment, considering:

- √ The sediment layer sampled,
- √ The height of overlaying water column
- √ Sediment texture (particle size range or % clay, % slit, % sand)
- √ Organic carbon content, dry matter content, and
- √ other parameters relevant for the specific goal of the analysis, such as pH, redox potential, organic and/or inorganic carbon content, cat ion exchange capacity, biologic al activity, content in sorption phases such as iron, aluminum or manganese, type of clay material.

A crucial decision of sediment monitoring is the choice of the horizon to be monitored. Grab samples as mostly applied so far do not give an accurate picture of the actual or historical conditions. In fact the top layer reflects the direct impact of present pollutant; the deeper layers provide the evidence of the antecedent pollution.

Suspended solids:

Please add the special equipment pictures here:

Other aspects to account for concern **pathways and fate:**

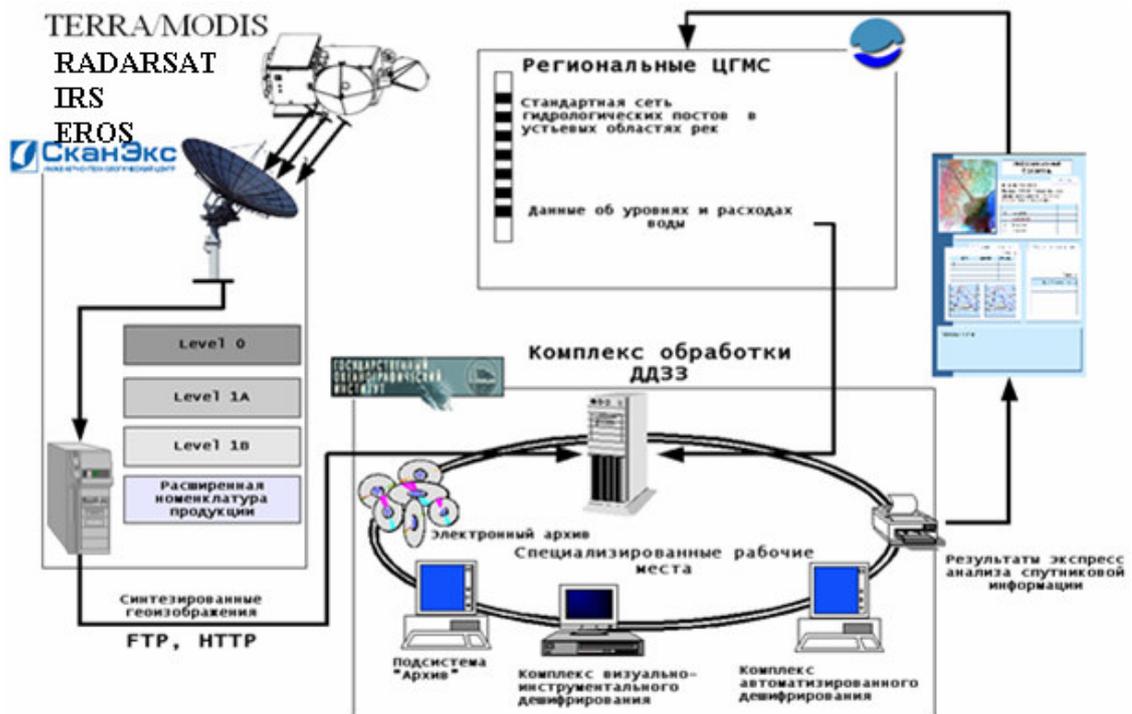
- √ The fate of the nutrients and other, oil products and trace elements from land based pollution sources entering the Caspian Sea;
- √ Physical, chemical and biological transformation of hydrocarbons, PCBs and oil products and contaminants,
- √ TENORM (Ra-226., Th-232, Rn-222 , Pb-210, Po-210) and other isotopes having oil and gas exploration origin at the Coast;
- √ The fate of pesticides (DDTs, lindane,...), and other coming from the agriculture and industrial sources (heavy metals, phenols other);
- √ The fate of pollutants having the municipal waste water origin (Coli, BOD, Phosphorus, other...);

- ✓ Aerosol fluxes. The fate of aerosol fallout on to the sea and secondary aerosol origin coastal area pollution;
- ✓ Sediment fluxes. The fate of the pollutants accumulated in the bottom sediment in their fixed and mobile phases (adsorption capacities of sediments, rate of sedimentation and remobilization abilities);
- ✓ The fate of contaminants assimilation and its uptake by the marine biota and the sea food chain analyses; others

In this regard the pathways and fate of pollutants in the environment are both a result of transport and transformation processes. The persistency, toxicity, and bio-accumulative potential of the substance are vital indicators for setting priority towards monitoring contaminants. In this regard hydrocarbons, copper and phenol for example are key examples, though phenol and hydro carbons are degradable and copper is not.

Reference was made to the “Methods for Sediment Sampling and Analysis”, prepared by CEP.

Satellite images can play a vital role in identifying pollution sources: CEP and SOI have very good experience in using Satellite images resources. SOI applies the following system:



Modeling is important component in RWQMP:

- ✓ An overall box-model, i.e. a water and pollution mass balance model
- ✓ A distributed 2D HD/AD model (e.g. MIKE21) for the coastal zone.
- ✓ Drifting models (for oil dispersion analyses)
- ✓ MINTEQ type models (mass-exchange boom-sediment – water masses)
- ✓ BOSS-SMS (RMA) model (wash-out of toxic materials from coastal inundated lands)
- ✓ Atmospheric dispersion models
- ✓ The future milestone is develop informational and modeling EDSS

Examples of priority RWQMPs:

Azerbaijan: Target area Baku Bay, Abcheron; Kura, Araks Rivers

- √ Expert Mission, visiting Laboratories,
- √ Evaluation of current monitoring programs, analytical and experts capacities
- √ Oil-Drifting Model application discussion
- √ Planning field studies, equipment; Research vessels
- √ Data analyses
- √ Discussion Concept and Regional Monitoring Program (Baseline and specific RWQMP)
- √ QC/QA planning

IR IRAN:

- √ Target area is the Coastal zone of Guilan and Mazandaran:
- √ Expert Mission, visiting Laboratories,
- √ Evaluation of current monitoring programs, analytical and expert's capacities
- √ Expertise of previous Data with special attention of qualification of the local experts
- √ Consulting in planning of the field studies, air origin, beaches and municipality sources;
- √ Discussion coordination, Data exchange and Concept for National and Regional Monitoring Program (Baseline and specific RWQMP)
- √ QC/QA planning and potential participation of the Laboratories in compliances with already done exercises under MEL (IAEA)

Kazakhstan:

- √ Expert Mission, visiting key Laboratories
- √ Evaluation of current monitoring programs
- √ Planning field studies, equipment and specific research needed
- √ Existing Data analyses
- √ Screening and Sampling exercises (Atyrau)
- √ Reference Samples to be analyzed in Local Laboratory and in referee EU Lab.
- √ Discussion RWQMP Concept
- √ Experience of AGIP co-operation and inter-calibration exercises
- √ QC/QA planning
- √ Some Specific expertise needed (for instance Uranium Mine tailing at the coast in Aktau, Koshkar-Ata or Oil polluted area at the coast)

Russian Federation:

- √ Contracting of experts and Procurement.....)
- √ Expert mission (Moscow + Astrakhan, Makhachkala ?)
- √ Preparation of the Program for sampling
- √ Agreement in methodology and requirements
- √ Cruses, sampling (Volga Delta, Terek River, Dagestan)
- √ Sample (water, bottom sediment forms screening analyses (SOI, Typhoon, Obninsk)
- √ Preparation of the Concepts (drafts) for RWQMP and QA/QC

Turkmenistan:

- √ Contact with CaspEcoControl
- √ Introduction with national monitoring approach
- √ Evaluation of the main sources of pollution
- √ Expertise of former Uranium Mines and tailings impact
- √ Selection of priority and needs for Technical assistance

Constraints for RWQMP implementation

- √ Lack of political support
- √ Different legislative framework
- √ Lack of analytical and technical capacities
- √ Borders and customs issues
- √ Sampling at the restricted areas of the Sea
- √ Constrains on samples transfer out of the countries
- √ Lack of communication
- √ Difference in methodological standards and requirements
- √ Access to the Data and Data exchange

- √ Other

Key Expert no 4: Industrial Engineer, Mr Ary de Koning, Sectoral approaches for APC Action Planning

The Objective of Task 5, Production of Regional Pollution Action Plans (RPAPs) is to develop remediation action plans for a number of typical problem areas and sites (demonstration projects). The Main Subtasks are:

- TA for assessment of current situation
- Development of action plan
- Pre-feasibility studies of selected projects
- Workshops on project progress
- Know-how dissemination and capacity building
- Development of draft guideline for R-PAP

a. TA for assessment of current situation:

- √ Making effective use of information published on the Internet in the regional context, making reference to the riparian states and river basins, the relevant sectors both land and sea-based;

b. Development of action plan

- √ Collecting baseline information on water polluting industries (existing and abandoned)
- √ Per country
- √ Per river basin
- √ Per sector (industry, power, mining, etc.)
- √ Per habitat; land-, littoral- and sea- based

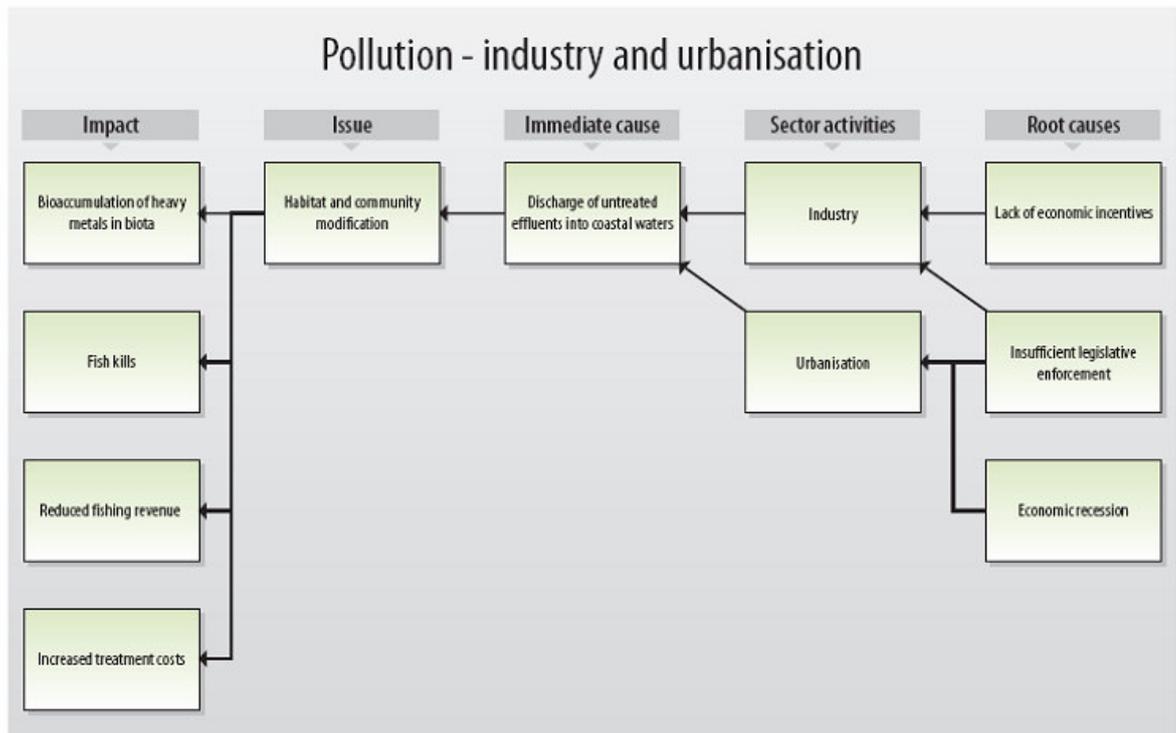


Figure 11 Causal chain diagram illustrating the causal links for industry and urban pollution.

- √ Selection of industrial sectors of concern
 - EU BREF Documents
 - WB Industry Sector Guidelines

- WB Decision Support System for Integrated Pollution Control (DSS/IPC) with database of wastewater discharge factors
 - Obsolete or abandoned industrial sites
 - Hazardous waste and mine tailing dumpsites.
 - √ Selection of sectors of concern , Examples:
 - (Petro-)Chemical plants
 - (Abandoned) Pesticide factories
 - (Abandoned) Oil production and refining sites
 - Base metal plants (ferro and non-ferro)
 - Metal products finishing factories
 - Textile dying and finishing
 - Pulp and paper mills
 - Leather tanneries
 - √ Development of action plan
 - Setting-up the analysis
 - *Drivers (oil and gas exploration, fishing, shipping, sea level fluctuation, urban, industrial and agriculture, incidents, accident and major catastrophes)*
 - *Pressures (emissions, over fishing, submergence or denudation)*
 - *State (immission, fisheries stocks, shoreline conditions)*
 - *Impact (exposure, uptake and effects on man, biosphere and the built-up environment)*
 - *Responses (mechanisms and instruments for pollution control, marine resource protection, and shoreline management).*
 - Making the diagnosis.
 - Developing scenario's
 - Selecting the most promising options
 - Pre-feasibility studies of selected projects
- c. Pre-feasibility studies of selected projects**
- √ Proposals for typical/demonstration pollution control and remediation actions/
 - √ (Pre-)Feasibility studies
- d. Workshops on project progress**
- √ Results baseline inventory
 - √ Results of analysis and diagnosis, and selection of scenario's and promising options
 - √ Results of Feasibility Studies and Action Plans (RPAPs)
- e. Know-how dissemination and capacity building**
- √ Technical workshops on Industrial Pollution Control (IPC/BAT from BREF and WB)
 - √ Technical workshop on set-up of RPAPs according to the developed guideline
 - √ Building up of documentation systems and databases for IPC and RPAP development
- f. Development of draft guideline for RPAP; Discussion items:**
- √ Legal mechanisms for introducing:
 - √ Good housekeeping,
 - √ Cleaner production, and BATEA (Best Available Techniques Economically Achievable).
 - √ Industrial restructuring based on:
 - √ Establishing industrial estates
 - √ Phasing out and remediation of obsolete processes and industry,
 - √ Relocating and concentrating industries,
 - √ Closing waste cycles by complementary production processes, joint utilities and facilities)
 - √ Financial instruments like:
 - Environmental funding,
 - Financial incentive mechanisms like rapid depreciation, grace periods, revolving funding
 - Improvement of environment by creating of win-win situations between the sectors and the competent authorities
 - Mechanisms like funds matching and alliance building, enabling sectors to find synergy with institutional investors
 - √ Seeking synergy and political embedding with existing initiatives under CEP-SAP. Priority will be given to actions that already are embedded in such a context.

Reference was made to following CEP papers:

- √ RPAP - Regional PTS Action Program for the Caspian Region, Elaborated under the CEP-SAP project: "Towards a Convention and Action Program for the Protection of the Caspian Sea Environment";
- √ NPAP - National PTS Action Plan for the Islamic Republic of Iran; Elaborated under the CEP-SAP project: "Towards a Convention and Action Programme for the Protection of the Caspian Sea Environment";
- √ Rapid Assessment of Point Sources Pollution in Iranian Part of Caspian Sea Area, using GIWA Methodology;

Following Tables were presented to illustrate some GIWA results [Source: Global International Waters Assessment (GIWA) Regional assessment 23 Caspian Sea© 2006 United Nations Environment Program]:

Table 7 Concentrations of various pollutants in the lower reaches of the Ural River.

Pollutant	Concentration (mg/l)	Maximum Allowable Concentration (MAC ¹) (mg/l)	Exceeded concentration (x MAC)
Oil products	0.43	0.05	8.6
Phenols	0.001	0.001	1.0
Surfactants	0.03	0.1	0.33
Copper	0.0053	0.001	5.3
Manganese	0.019	0.01	1.9
Iron	0.056	0.5	0.112
Lead	0.02	0.03	0.67
Nickel	0.006	0.01	0.6
Molybdenum	0.003	0.25	0.112

Note: ¹ Maximum Allowable Concentration (MAC) of harmful substances in the surface waters were used in the former Soviet Union for assessment of the surface water quality. Even after the disintegration of the Soviet Union, Azerbaijan, Kazakhstan, Russia and Turkmenistan still use MACs for this purpose. (Source: CEP 1998c)

Table 9 Pollution loads from rivers, municipalities and industry in the littoral countries.

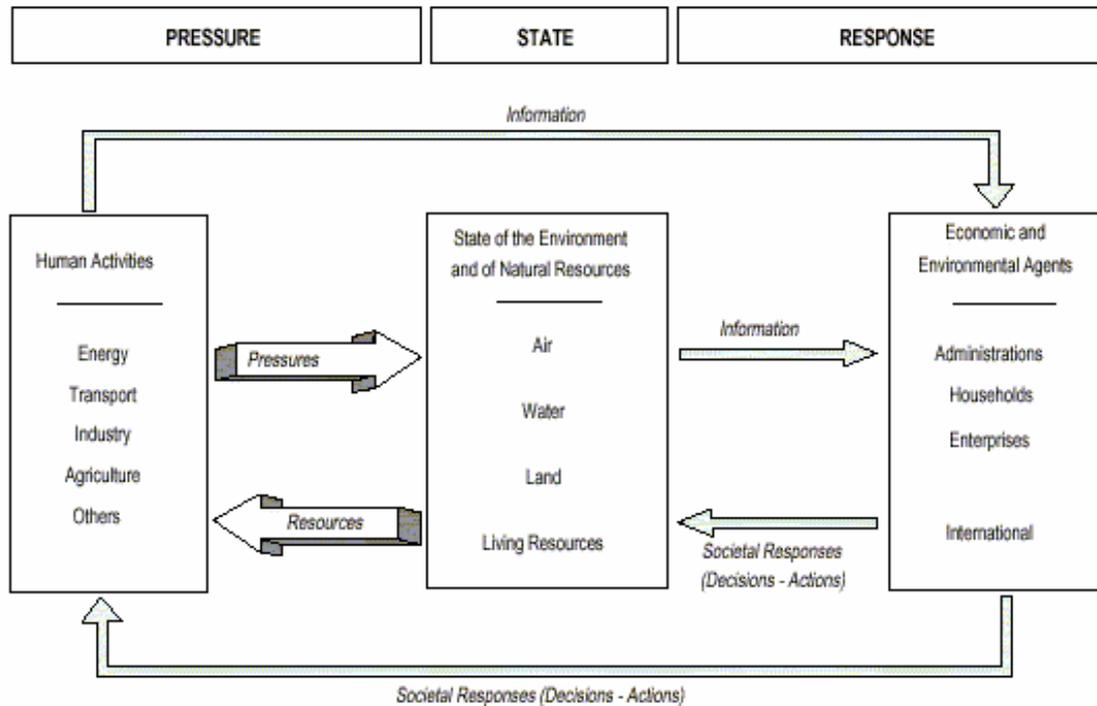
Country	Sources	Riverflow (km ³ /year)	BOD (tonnes/year)	Nitrogen (tonnes/year)	Phosphorus (tonnes/year)	Oil (tonnes/year)
Azerbaijan	Rivers	15.2	36 000	19 000	1 000	600
	Municipalities		38 000	13 000	3 300	9 400
	Industry		7 100	1 100	300	14 000
Sub-total		15.2	81 100	33 100	4 600	24 000
Iran	Rivers	17	49 500	12 000	1 200	400
	Municipalities		68 000	16 000	4 400	7 800
	Industry		28 200	600	210	12 500
Sub-total		17	145 700	28 600	5 810	20 700
Kazakhstan	Rivers	9.8	13 200	6 000	600	400
	Municipalities		800	500	100	200
	Industry		2 900	7 100	100	1 800
Sub-total		9.8	16 900	13 600	800	2 400
Russia	Rivers	257.4	807 900	805 000	87 500	73 100
	Municipalities		1 600	400	100	100
	Industry		1 500	100	3 970	5 400
Sub-total		257.4	3 100	500	4 070	5 500
Turkmenistan	Rivers	0	0	0	0	0
	Municipalities		1 600	400	100	100
	Industry		1 500	100	3 970	5 400
Sub-total		0	3 100	500	4 070	5 500
All countries	Rivers	299.4	906 600	842 000	90 300	74 500
	Municipalities		124 400	34 900	9 300	21 300
	Industry		44 600	9 200	4 680	42 600
Total for Caspian	All sources	299.4	1 075 600	886 100	104 280	138 400

Note: BOD = Biological Oxygen Demand. (Source: CEP 2002c)

KE4 articulated these data need to be further elaborated for making a targeted action plan.

TL presented resume on DPSIR and Use of Indicators in Action Planning:

DPSIR builds on the Driving Force-State - Response Framework (OECD-PRS). The PRS philosophy is as follows:



EU's DPSIR Framework provides an overall mechanism for analyzing environmental problems.

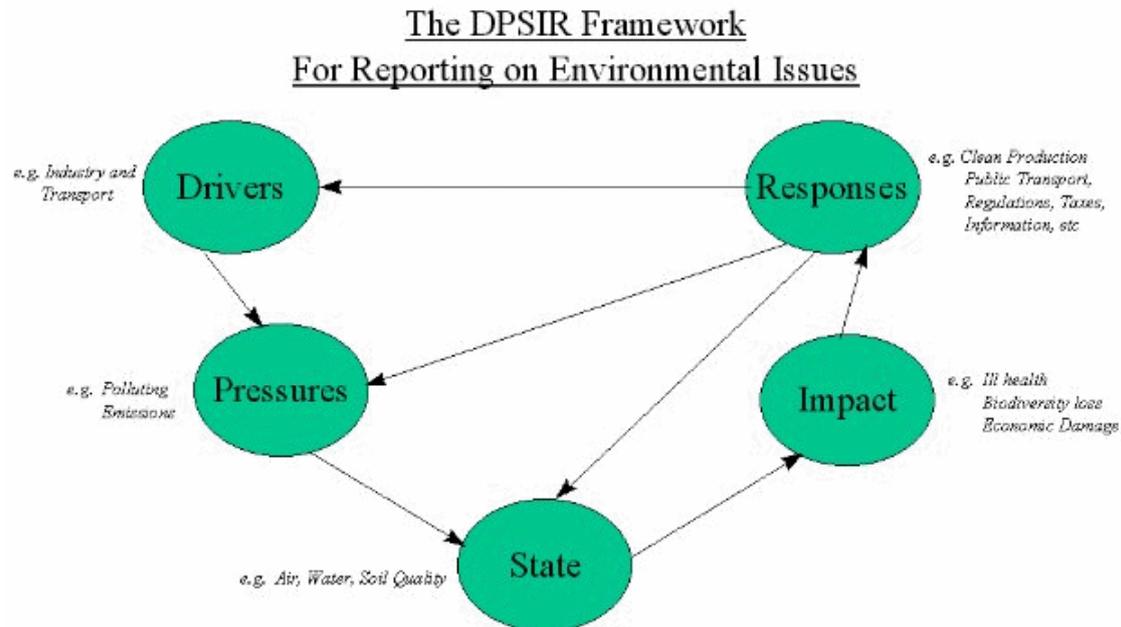
- ✓ Driving forces, such as industry and transport, produce
- ✓ Pressures on the environment, such as polluting emissions, which then degrade the
- ✓ State of the environment, which then
- ✓ Impacts on human health and eco-systems, causing society to
- ✓ Respond with various policy measures, such as regulations, information and taxes, which can be directed at any other part of the system

This causal framework approach for describing the interactions between society and the environment adopted by the EEA will be used as a rational tool. It is referred to as DPSIR, the Driving Force-Pressure-State-Impact-Response Framework, (an extension of the PSR model developed by OECD).

In other words DPSIR stands for:

- ✓ Drivers of sectoral development, based on human activities, exerting
- ✓ Pressure on the environment (emissions, interventions, depletion of resources, which determine the
- ✓ State of the environment (quality of air, water, soil, groundwater, or the intensity of light, heat, noise, vibration and radiation), resulting in
- ✓ Impact on health, biosphere and cultural heritage, based on expo-sure, intake and effect, and prompting
- ✓ Responses in terms of preventive an curative environmental policies, plans, programs and projects from the authorities.

Following diagram (EEA) illustrates it:



The Role of the EEA is:
To provide information on the DPSIR Elements and their
Inter-connections, and on the effectiveness of Responses

For our project the ultimate question is: “Where, what, when to monitor and how, but especially WHY? This answer is found by looking at the information we need in order to make action plan to combat pollution. Therefore we need indicators to formulate, structure, and embed our policies and to monitor the results for evaluating their success and making the necessary amendments. This has to be based on indicators at different level of intervention, for

- √ Strategies
- √ Policies
- √ Plans and programs
- √ Projects, considering the
 - Environmental themes and
 - Environmental media

Use of Indicators in Strategic Planning:

For preparing SAPs indicators will be used for evaluating measures in the policy cycle and in the hierarchical planning. In the policy cycle indicators play a vital role in monitoring policy execution and evaluating impact and effects of policy. Indicators also are used at different level of intervention, in a hierarchical order for evaluating strategies, policies, plans and programs, projects, environmental themes and media.

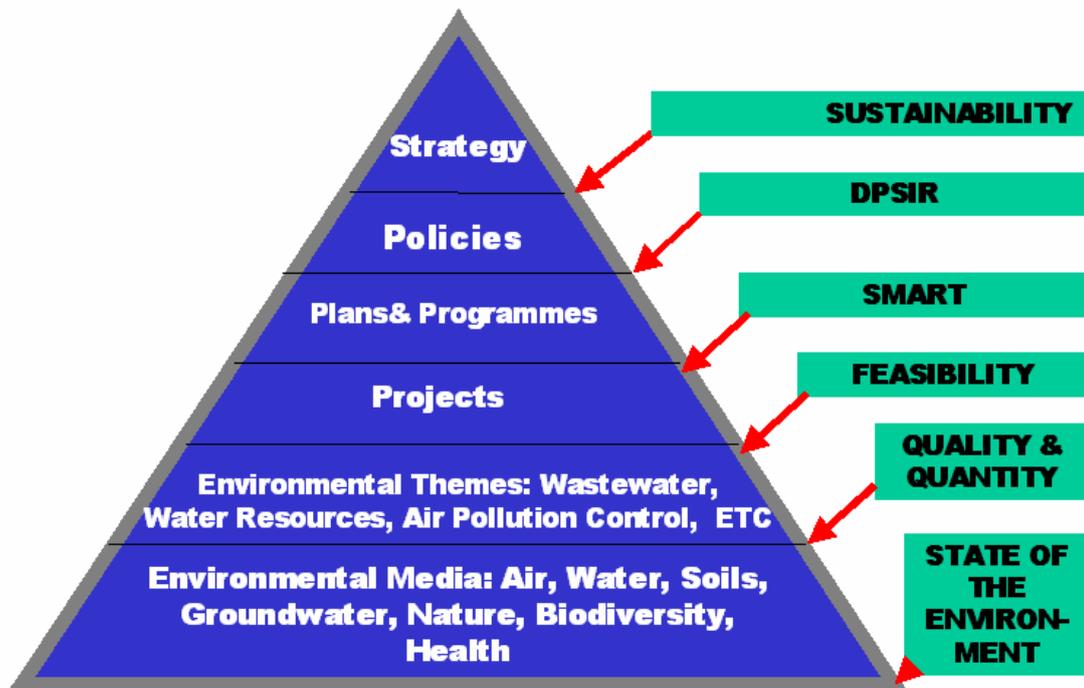
Strategies can be evaluated with OECD/DAC sustainability indicators:

- √ Sustainability
- √ Efficiency
- √ Effectiveness
- √ Impact
- √ Relevance
- √

Bilateral donors often add indicators describing impact on:

- √ Poverty alleviation

- √ Gender
- √ Human rights
- √ Democracy
- √ Decentralization
- √ De-concentration and
- √ Good governance



Policies are evaluated with DPSIR indicators:

- √ Drivers of sectoral development
- √ Pressure on the environment
- √ State of the environment
- √ Impact on health, biosphere and cultural heritage,
- √ Responses

Plans and programs can be evaluated with SMART indicators: Investment packages in plans and programs can additionally be also analyzed with LFA indicators, which should be SMART:

- √ Sensitive
- √ Measurable
- √ Accepted
- √ Representative and
- √ Timely

Projects can be evaluated with Feasibility Indicators: They are applied to assess and monitor technical, economic, financial, social and environmental viability of specific interventions, for example building a waste treatment facility; they include econometric indicators like:

- √ B/C (benefit/Cost ratio)
- √ NPV (net present value)
- √ FIRR (financial internal rate of return) as seen from monetary perspective
- √ EIRR (economic internal rate of return) as seen from entrepreneurial perspective
- √ FERR(financial external rate of return) as seen from society and monetary perspective
- √ EERR(economic external rate of return) as seen from society and entrepreneurial perspective

Environmental Plan Indicators are applied to the environmental themes considered. These are Indicators pertaining to the state of the environment as related to the interventions. These are DPSIR-oriented parameters, with a strong emphasis on emissions or load reductions, in a time and a space frame; they concern **pollution loads** typified in **Quality and Quantity (Q+Q)**; for example tons of oil released per year. EU/ECE Conference in Kiev, 2003, has suggested DPSIR oriented environmental theme indicators, which are relevant at large as related with

- √ Depletion of water resources,
- √ Deterioration of water quality,
- √ Depletion of natural resources,
- √ Land degradation,
- √ Air pollution,
- √ Noise,
- √ Climate change
- √ Deterioration of nature
- √ Biodiversity and heritage protection

At ground level these indicators are derived from the parameters used to describe the state of the environment; examples:

Depletion of water resources can be indicated with:

- √ Changes in hydrological regime: water discharge, surface area, water temperature, sediment load, suspended solids, salinity;
- √ Changes of the piezometric head in the relevant aquifers (in cm)
- √ Changes in the salinity levels in the coastal aquifer system (in mg/l)
- √ Changes in the water balance (at an appropriate sub-basin level) of total annual water use and recharge (in MCM/yr)

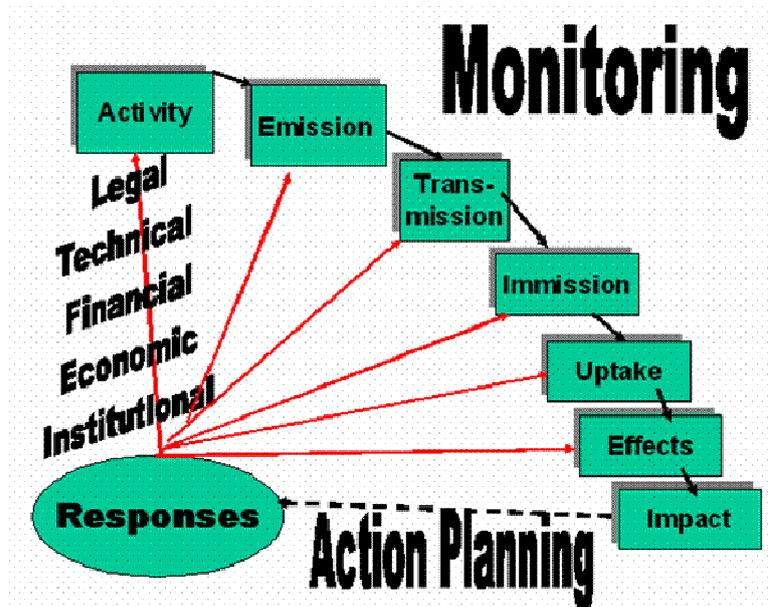
Deterioration of water quality can be indicated with:

- √ Reduction in application rate of pesticides and fertilizers;
- √ Indicators to quantify the industries (by type of industry) which have adopted Best Available Techniques (BAT);
- √ Percentage of dumpsites equipped with proper protection measures (sanitary land-fills);
- √ Percentage of wastewater receiving proper treatment, enabling re-use;
- √ Eutrophication rate: total N, P and chlorophyll A;
- √ Pollution by sewage: O₂, Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD);
- √ Organic and inorganic pollution: heavy metals, micro-pollutants;
- √ Ecological state: productivity, species diversity, and incidence of fish diseases

Shoreline can be indicated with:

- √ Percentage reduction of waste load entering the recreation zone;
- √ Percentage of wastewater receiving proper treatment, enabling re-use;
- √ Number of Shoreline cleaning actions being carried out

The essential message is that monitoring is a tool for action planning as illustrated in following diagram. People may think it is a bit complicated, but it is not. The essential message is that monitoring should be **KISS**, "Keep It Simple Stupid", and thus will help focus the project to action oriented monitoring enabling adequate responses.



VII. COMMENTS ON DRAFT INCEPTION REPORT

Caspian countries addressed their comments on the Inception Report articulating the need to well observe the national interests on one hand, while embedding activities in a common Caspian framework on the other. They demanded the actions to be well geared to the results achieved under CEP and to fine tune them to the new Transboundary Diagnostic Analysis (TDA), to be discussed June 6-8, 2007 in Tehran.

The present draft Inception report therefore needs to be further operationalized, enabling a country specific approach in a common framework. As well financial and staffing issues needs to be further clarified, which should be done on a country by country basis. Detailed additional comments were submitted on a country by country basis.

CEP manager strongly articulated to be modest in objectives. Unanimously participants stressed not to over articulate modeling. In discussing local laboratory capacities, reference can be made to latest experiences of CEP, KCO and other oil consortia.

VIII. MAJOR FINDINGS OF THE INCEPTION WORKSHOP:

The TACIS project 2005/109-244 "Caspian Water Quality Monitoring and Action Plan for Areas of Pollution Concern" is a challenge to strengthen the dialogue and cooperation between the countries around the Caspian and the EU. The technical assistance will be geared to realize this and the work plan will be elaborated in this direction. We are planning it for July 1st, 2007.

Turkmenistan as the hosting country of this workshop has shown its great commitment by facilitating it so well. Now the Minister of Natural Protection of the host country has offered Ashgabat as duty station. Though initially we all pointed at Baku, the procedural problems faced made us change our mind. If the logistical problems become under control the Consortium will settle the duty station in Ashgabat. If necessary and accepted by EU the Consortium may consider keeping-up a logistical basis in Baku, but this can not be decided now. The contract provides for one duty station only.

The purpose of this project is to develop effective mechanisms for water quality monitoring and action planning for pollution control, enabling a better protection of the Caspian's pristine ecosystem. All representatives of the Caspian counties and the representatives of the oil industry expressed their commitment to help enable this. The outcome should be a strengthened regional dialogue on the water quality improvement of the Caspian supported by tangible results. This has to be achieved by putting the national efforts in a regional approach fully in line with the results achieved so far by the Caspian Environmental program.

What we have learned in this workshop that the technical assistance should be targeted towards capacity building for water quality monitoring and pollution abatement action planning. This means that we have to change the attitude, to develop new impetus, provide new equipment and new methods, give technical training, but especially help develop a pragmatic approach that is scientifically justified, replicable, and accepted and applied in all countries of the Caspian Sea region. A new mentality and an alternative focus are needed, requiring changes in mind set. The project has to work on this.

As mentioned workshop, there is abundant historical information on the Caspian water quality, mainly available in Institutes in the Russian Federation. Scientific data have been published in text books. After the split-up of the FSU each of the riparian states has continued with his own program, but national resources were limited and the data are not shared between the riparian states. Some routine water quality monitoring was reinitiated, but the programs are not targeted towards measuring the direct impact of land based pollution sources. Most important the measurement programs are not action oriented, because the information is not used for pollution abatement planning. There is weak regulation and permitting, let alone monitoring for compliance control.

New initiatives however have been developed in relation with identifying pollution loads, especially for zones affected by oil and gas exploration and exploitation, or uranium mining activities. The most important monitoring initiatives have been developed by the oil and gas industry, not as regulatory but as a pro-active instrument. EIA baseline monitoring is carried out to assure operations meet international environmental standards and the companies are protected against litigation claims. Not only indemnification is driver for this. Also their business integrity management systems demand it. Sustainable entrepreneurship is unthinkable without prime attention for health, safety and environment. By developing these baseline data studies, a wealth of information is acquired, but understandably not disclosed all in the public domain. Initially starting as a snap shot effort, now the oil industry is working in the direction of a more continuous monitoring program, acting as an early warning system. The mussel watch is an example.

Not completely these private sector early warning monitoring initiatives stand alone. Supported by TACIS, a storm surge warning system for the North eastern Caspian has been made operational. It is operated by KazHydromet, but the results are shared with the oil industry and other stakeholders, enabling smooth operation and management and enabling emergency preparedness. Another example is the oil drift model, sponsored by NATO's "Science for Peace Program", enabling better oil spill responses.

In parallel with the private sector, some states are implementing pollution load oriented surveys in the Caspian coastal zone, for example Kazakstan. These initiatives are very important and need to be strengthened. As yet the problem is that results are not shared with the other countries. Also within the countries the information is not part of the public domain, though it is acquired for serving civil society. Possibly not all this information is of direct importance in the transboundary context. However it is the basis for assessing pollution loads possibly reaching the Caspian and that is what we want to know: "The quantity and quality of the land-based pollution loads potentially affecting the Caspian".

Under the umbrella of the Caspian Environmental Program, UNEP's Global Internal Waters Assessment (GIWA) has been deployed. The results did not yield the information looked for. It possibly is not because of the method, but because of the lack of access to the information. Mass-balances for pollution loads only can be drawn up if there is sufficient information on the volume of the flow per unit of time and the concentration of its constituents on a representative time scale.

Now after the forthcoming First Convention of the Parties of the Tehran Convention in Baku, we have the opportunity to enter a new era where sharing of information is a common goal and working it out unbiased is a common good. By doing this we will do our work in the spirit of the Aarhus Convention, enabling free dissemination and access to information in the public domain. It will bring the region closer to Europe and Europe closer to you, realizing good neighborhood relations.

The project provides for methods and tools for inter-calibration and limited funds for it are available. The project also provides funds for logistic support to monitoring land based pollution sources and their impact on the coastal water. Our project also provides funds for contracting national experts and once the work plan is approved we will do that, following the TACIS procedures, bearing in mind the national setting in each country.

A parallel EU project, "Supplies for the Caspian and Black Sea Environmental Projects", tender EuropeAid/122682/C/SUP/MULTI will provide equipment and our project will seek a strong synergy with it.

Substantial time will pass however before this equipment are on the floor of beneficiaries laboratories. This workshop has taught us as yet we can not bank for a large extent on pollution monitoring budgets of the riparian states. It is for this reason the project has addressed TACIS for extra support for sampling and analysis, and access to satellite imagery plus equipment for ground truth fact finding (if not provided under the separate procurement contract), enabling a rapid and adequate assessment.

Bearing in mind these options and constraints we have to be modest in our objectives and careful in our operations. We can spend the money only once. For the next six month we concluded we have to intensively familiarize with the country situations, considering the available information on the hot spots, the laboratory capacity, the capacity building needs, and most important all work that is about to be completed under CEPs Regional Environmental Monitoring Program (REMP). To the extent possible we will build on the results obtained, but we have to work on this new approach where monitoring is synonym with action planning and action planning unthinkable without monitoring. We will try to fill in the gaps and focus work to the very national needs, but in a harmonized way enabled by the Tehran Convention.

SAPICs, P-RAGs and representatives of the oil industry have offered the team a very good support and a wealth of wisdom and experience. We can only jointly do our work by building on this. We hope we can strengthen this cooperation and thus together achieve a better water quality of the Caspian.

