2007 Black Sea TDA
General Comments

- Larger than 1996 TDA - contains information from a broader range of analyses
- Differently structured than 1996 TDA to help identify where individual pieces of information lie
- Major effort to gather available information
- 66 contributing specialists
- Blue boxes to compare changes with 1996 TDA
**Structure**

- Description of the Region
  - Socio-economic situation
  - Governance/management/stakeholders
  - Environmental status – water resources, chemistry & biology
  - Geography
  - Public perception

- Transboundary problems
- Hot-spots analysis
- Governance analysis
- Stakeholders analysis
<table>
<thead>
<tr>
<th>Transboundary Problem</th>
<th>Median Score</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decline in natural resources (e.g. fish stocks)</td>
<td>3.0</td>
<td>High</td>
</tr>
<tr>
<td>Nutrient over-enrichment/eutrophication</td>
<td>3.0</td>
<td>High</td>
</tr>
<tr>
<td>Chemical pollution</td>
<td>3.0</td>
<td>High</td>
</tr>
<tr>
<td>Habitat and biodiversity changes</td>
<td>2.0</td>
<td>Moderate</td>
</tr>
<tr>
<td>Alien species introduction</td>
<td>2.0</td>
<td>Moderate</td>
</tr>
<tr>
<td>Coastal erosion</td>
<td>1.0</td>
<td>Low</td>
</tr>
<tr>
<td>Changes in the flow regime of rivers</td>
<td>1.0</td>
<td>Low</td>
</tr>
</tbody>
</table>
Problems - Contents

- Description
- Envt’l impacts and socio-economic implications
- Linkages with other problems
- Causal chain analysis
  - Immediate
  - Underlying
  - Root
- Knowledge gaps
Eutrophication (1)

Nutrient concentrations:

Nitrate

Phosphate
## Nutrient Budget (tonnes):

<table>
<thead>
<tr>
<th>Nutrient Source (tonnes)</th>
<th>DIN</th>
<th>%DIN</th>
<th>PO\textsubscript{4}-P</th>
<th>%PO\textsubscript{4}-P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct discharges from large UWWTPs</td>
<td>6,120</td>
<td>1</td>
<td>2,150</td>
<td>8</td>
</tr>
<tr>
<td>Direct discharges from large industrial sources</td>
<td>1,180</td>
<td>0</td>
<td>250</td>
<td>1</td>
</tr>
<tr>
<td>River loads</td>
<td>497,590</td>
<td>52-68</td>
<td>20,043</td>
<td>70</td>
</tr>
<tr>
<td>Istanbul Strait</td>
<td>29,000</td>
<td>3-4</td>
<td>6,000</td>
<td>21</td>
</tr>
<tr>
<td>Kerch Strait</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Atmospheric deposition</td>
<td>203,040-431,460</td>
<td>28-45</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>736,930-965,350</td>
<td>100</td>
<td>28,443</td>
<td>100</td>
</tr>
</tbody>
</table>
Eutrophication (3)

- 60% of DIN and 70% of PO$_4$ from rivers
- Direct discharges from large municipal/industrial plants are only 2% of the river DIN and 13% of the river PO$_4$ load
- The Danube accounts for about 88% of the river DIN load and 50% of the PO$_4$ load
- Atmospheric deposition of N may approach river loads
- Need to update/harmonise monitoring protocols
Eutrophication (4)

- 60% of DIN and 70% of $\text{PO}_4$ from rivers

- Direct discharges from large municipal/industrial plants are only 2% of the river DIN and 13% of the river $\text{PO}_4$ load

- The Danube accounts for about 88% of the river DIN load and 50% of the $\text{PO}_4$ load

- Atmospheric deposition rates of N may approach river loads

- Need to update/harmonise monitoring protocols
Nutrient emissions to the Danube have been substantially reduced over the last 15 years: nitrogen emissions by about 20% and phosphorus by almost 50%.
Livestock numbers in 2004 were about two-thirds of those present in 1997, and about one-third of the numbers recorded in 1998.

Likewise, inorganic fertiliser application rates in Romania in 2004 were about one-third of what they were prior to the collapse of the Soviet Union.
Turkey responsible for ~80% of total Black Sea catch

Total landings appear to be increasing; still only about half the levels recorded in the 1980s
Changes in MLR (2)

Picture is not as rosy as previous slide suggests - landings of some species increased (e.g. anchovy, sprat)
But landings of other species have decreased (e.g. whiting, horse mackerel)

Moreover, landings data underestimate catches
Changes in MLR (4)

Catches/landings tell a very incomplete story; fishing effort has to be considered.
Changes in MLR (5)

So do changes in types of fishing gear used

Romanian data
Changes in MLR (6)

No useful regional measure of unit effort

Vessels >12 m
Some countries set TACs, but landings data is questionable and illegal fishing is a problem.

Exacerbated by a lack of regionally agreed national fishing zones in all Black Sea countries.

No regionally agreed stock assessment methodology.

Existing national stock assessments are often out of date.
Chemical Pollution (1)

Status maps:
- Chromium
- Copper
- Total Organic Carbon
- Total HCHs
Chemical Pollution (2)

Chemical pollution underlies the transboundary biological problems.

Loads data is too inconsistent to present a regional overview, except for BOD.

Monitoring data, particularly for organics, requires a huge amount of work.

BSIMAP is not working. Some countries very good; others much worse.
Chemical Pollution (3)

- Emphasis of monitoring should be on concentration monitoring in the Sea
- Very little bioaccumulation/body burden data available
- Concerns raised over some POPs
- Geological origins of some heavy metals
- Local investigations required to identify sources
- Increased concerns over oil from shipping and offshore installations
Chemical Pollution (4)

Suite of recommendations made to help target priorities for the Black Sea
Biodiversity/Habitat Changes (1)

- Alien introductions have continued unabated (48 new spp. identified between 1996 and 2005)
- Now 217 registered alien species: half are permanently established and a quarter highly or moderately invasive
- Coastal development and non-sustainable fisheries practices are seen as the major physical causes of habitat damage
- Shipping and aquaculture are the primary vectors of alien species introductions
Vectors of Introduction

By far the most important routes of introduction are shipping and aquaculture.
Biodiversity/Habitat Changes (2)

- All 5 coastal margin habitats are in a critical status in at least one country.
- Benthic pelagic habitats are critical in at least one country.
- 13 of 37 types of benthic habitat are considered to be critical in at least one country.
- Those habitats most at risk include the neritic water column, coastal lagoons, estuaries/deltas and wetlands/saltmarshes.
Biodiversity/Habitat Changes (3)

- The huge reductions in areas of *Phyllophora* and *Zostera* have greatly reduced biodiversity.
- Alien species introductions have also reduced biodiversity substantially.
- Recent and obvious improvements have occurred in the NW Shelf.
- Eutrophication has been greatly underestimated as a contributory factor to reduced biodiversity.
Threats to Red List Species

- Water reg’n land reclam’n
- Chemical pollution
- Parasites, diseases, competition
- Habitat destruction
- Biological character’ics
- Disturbance tourism
- Over-exploitation
- Eutrophic’n

- AGR 4%
- FOR 2%
- BIO 7%
- CLI 1%
- DIS 13%
- EUT 8%
- EXL 16%
- HAB 18%
- POL 18%
- PAR 5%
Hot-Spots Analysis

- 12 have been completed
- 2 are no longer required
- 10 Work in progress
- Over half have no plans for completion or only partial investments have either been or are planned to be made

By the end of 2005 at least $143 million had been spent, with a further $340 million planned to be spent by the end of 2015.
Stakeholders Analysis (1)

- 435 survey returns
- 42 stakeholder groups

Is the Black Sea healthy? Are you responsible for the health of the Black Sea?

- Do not know: 6%
- No: 61%
- Yes: 33%

Percentage of stakeholders:
- Not at all
- Not directly
- No opinion
- Yes indirectly
- Yes directly
Stakeholders Analysis (2)

Ranking of major transboundary problems:

1st Chemical pollution
2nd Changes in marine living resources (fisheries)
3rd Changes in biodiversity
4th Nutrient enrichment/eutrophication

Information dissemination is critical

Surprisingly high amount of willingness for Stakeholders to be actively involved in environmental protection