UNDP/GEF PROJECT ENTITLED "REDUCING ENVIRONMENTAL STRESS IN THE YELLOW SEA LARGE MARINE ECOSYSTEM"

UNDP/GEF/YS/RWG-F.1/5
Date: 23 March 2005
English only

First Meeting of the Regional Working Group
For the Fisheries Component of
the UNDP/GEF Yellow Sea Project
Qingdao, China, 11-14 April 2005

Data and Information Requirements

The final outputs of the UNDP/GEF Yellow Sea Project are to prepare a Transboundary Diagnostic Analysis (TDA), Regional Strategic Action Programme (SAP), National Yellow Sea Action Plans, and demonstration of the SAP. Document UNDP/GEF/YS/RWG-F.1/4 described the general process to develop the TDA and the requirements from the Regional Working Groups to set a common ground for data acquisition. This document describes in more detail the last few step of the TDA development process, in particular, the causal chain analysis and governance analysis. After understanding these procedures, the Regional Working Group (RWG) should discuss and agree on the basic requirements and procedures for preparing an initial causal chain analysis, governance analysis, and propose some solutions to address the pollution-related problems in the Yellow Sea.

Causal Chain Analysis

A causal chain analysis is a linear approach to analysing the proximate and ultimate or, root causes of observed environmental issues or problems in a specific location. Whilst such an analysis can be conducted for a wide geographic area, the end results do little more than identify areas of intervention either at the level of issue or problem or the level of cause.

When such an analysis is conducted at the scale of a specific intervention, it provides information regarding the best point of intervention along the chain, and at which point maximum benefit can be derived for minimum cost. Future corrective actions can only be proposed with confidence if the whole chain of symptoms, causes and effects is understood. Such a causal chain analysis has to be carried out for each priority problem. The completed causal chain analysis should help to locate potential areas of intervention for the GEF, and is an important basis for the design of the practical actions that will be included in the SAP.

The causal chain relates the problems to their immediate physical causes and their social and economic underlying causes. However, there is a danger here of confusing problems and immediate causes. For example, take the question of 'Pollution hot spots'. Should the existence of hot spots be described as the problem to be dealt with, or is it the impact or cause of another problem? The outlined causal chain diagram in Figure 1 shows that the hot spot is the immediate cause of the problem.

During the TDA, the interaction between causes and effects of key transboundary problems has to take into account the **geographical scale** of the environmental and social impacts of a problem. Remember: the problem itself and the causes of the problem may be different.

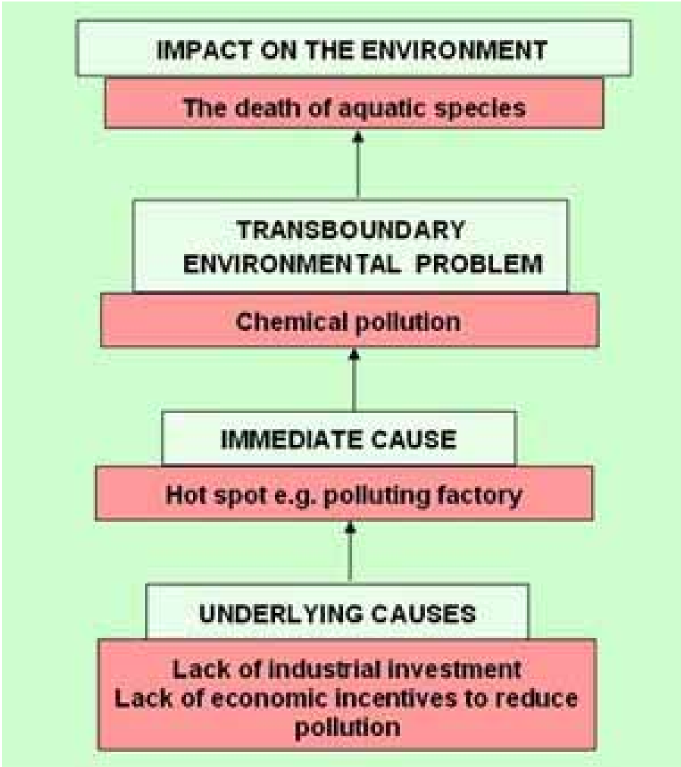


Figure 1. Sample of causal chain diagram.

Completion of a causal chain analysis for each of the priority problems requires a mixture of expertise: scientific for the immediate causes, and social and economic for the underlying and root causes.

Immediate causes are usually technical in nature and should be quantified, prioritised and geographically located. **Underlying causes** are those that contribute to the immediate causes. They can broadly be defined as **sectoral** resource uses and practices, and their related social and economic causes.

Beyond the sectoral causes however, are deeper **root causes** of the problems, often macroeconomy, demography, consumption patterns, environmental values and access to information and democratic processes. Most of these are beyond the scope of GEF's intervention but it is necessary to document them. The reason for this is that some proposed solutions may be unworkable if the root causes of the problem in question are overwhelming. Furthermore, actions taken nearer to the root causes are more likely to have a lasting impact on solving the problem.

To carry out the causal chain analysis in a specific location and for a specific environmental problem, in most cases, the environmental and socio-economic data and information to support the statements are made in the analysis. Only with strong scientific backing, can the causal chain analysis can be persuasive.

Governance Analysis

The term ‘governance’ is short for the whole political environment: institutions, laws, policies and projected investments that affect environmental problems. The analysis of these is known as **governance analysis**.

The existence of a problem implies that some parts of the current mechanisms or their implementation are insufficient, otherwise the problem would not exist. Therefore, these mechanisms and the reasons for any failure must be documented in order that appropriate interventions can be suggested.

An important characteristic of governance analysis is to find out where decision-making power really sits, and how the mechanisms actually work, as opposed to how they are supposed to work.

Governance analysis should describe the dynamic relations within the political and social structures that underpin such aspects as legislative and regulatory frameworks, decision-making processes and budgetary allocations. In carrying out the causal chain analysis, many cross-cutting underlying causes will be found to be governance issues.

The governance analysis should be conducted by regional experts, and there should be regular feedback between all groups in order to understand the dynamics and synergies between the causes of transboundary problems and possible failures in governance.

The example below shows the causal chain and governance analysis for the problem of algal blooms in the Adriatic Sea.

Example 1. Algal blooms in the Adriatic Sea.

Algal blooms in the Adriatic Sea result in unsightly algal deposits on tourist beaches, which in turn result in reduced tourist income. A secondary effect resulting from increased nutrients is eutrophication, increased BOD and reduced availability of dissolved oxygen in the water column, which results in wide-spread fish and invertebrate kills resulting in loss of fisheries income and changes in biological diversity.

The **immediate cause** of the problem is increased nutrient availability in the water column derived from two sources, agricultural fertiliser run-off and discharge of untreated domestic wastes including sewage. Of the two, run-off of fertiliser from the intensive rice production of the Po valley is the dominant source of nutrient input. This in turn reflects excessive fertiliser use, poor agricultural practices and the artificially low price of fertiliser due to government subsidy and the common agricultural policy of the European Union. Whilst some environmental improvement could be effected via changes in fertiliser use and agricultural practices, the key to effecting change in this instance involves a change in government policies, which remove the subsidy on fertilisers, which in turn requires a change to the common agricultural policy of the European Union. Effecting change at the level of policy within the European Union requires changes involving all member states of the Union not merely the ones impacted by the observed loss of environmental quality.

The discharge of untreated sewage whilst it represents a significant source of nutrient input which is widespread along the coast of the Adriatic is less significant than agricultural run-off; hence intervention in this chain of cause and effect will have less impact in terms of reducing nutrient loads than intervention in the agricultural sector.

This example illustrates three significant points: 1) firstly, the need to identify the primary causes and rank their importance where more than one source is involved; 2) secondly, the need to identify the precise points of intervention that will have the greatest effect; and, 3) thirdly, that some causes may be beyond the capacity of the involved countries to address, since they involve countries outside the area of impact, i.e. they are transboundary at the policy level.

	Causes of observed problem						
Issue or Problem	**Immediate Cause**	**Level 2 Cause**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Ultimate or root cause**
Algal blooms (Adriatic sea)	Increased nutrients	Agricultural runoff (Po River)	Excessive fertiliser use	Poor agricultural practices	Low price	Govt. subsidy	Common Agricultural policy of the EU
		Discharge of sewage	No treatment	Lack of capital	Political will		

Once the characterisation has been completed, a causal chain analysis needs to be completed for each site that identifies the key environmental issues, problems or threats and their causes prior to conducting a cost benefit analysis for each potential intervention. Then a clear identification of the relative importance of each identified problem and the comparative importance of each cause in the case of problems with multiple-cause choices regarding the priority interventions can be made.

Solution Guideline

At a later stage, when the causal chain and governance analysis have been completed, one must formulate solutions to address the problems. The solutions and actions will contribute to the SAP. While it is beyond the scope of the First RWG Meeting to start formulating solutions, Example 2 provided below is for future reference, and to give an idea of the RWG's task ahead when the Project reaches the SAP development stage.

At the right hand end is the problem to address. In this example, it is loss of seagrass beds and aquatic organisms in Thailand. In the case for the RWG-F, it may be the decline of coastal fish stocks in the vicinity of Mariculture farms.

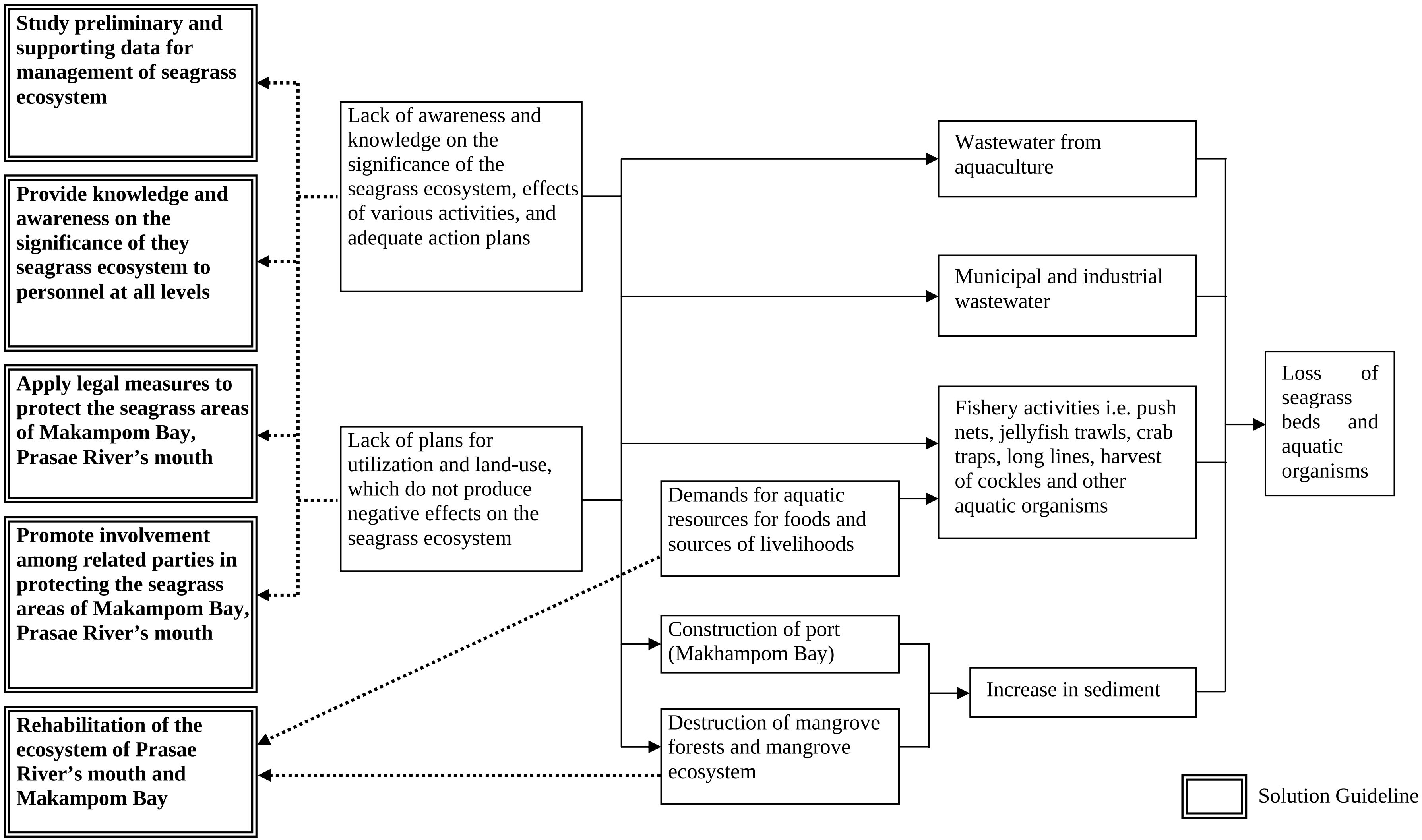
Immediately beside the problem, is the first level cause of the problem, and to the left of that, the second level, etc, until the root cause of the problem (second column from left). In this example, the root cause was sometimes a lack of awareness of the impacts of these activities on the ecosystems, and lack of land use planning leading to sedimentation getting to the reefs and seagrasses, etc.

At the far left, are the interventions needed to address the root causes of the problem. Not all interventions may be possible to address, as mentioned in Example 1. However, the interventions will be listed in the SAP, and where possible, tested at demonstration sites. In the longer-term, the proposed interventions will serve as guidelines for regional actions to manage the Yellow Sea ecosystem.

RWG Tasks at Hand

The First RWG-F Meeting will begin the initial steps for TDA/SAP development. The two spreadsheets annexed in this document are a starting point for agreeing on the data requirements for TDA, and a working example for the causal chain and governance analysis. During the Meeting, participants will finalise the table of data requirements, and go through an exercise to develop a causal chain analysis.

Example 2. Site-specific causal chain analysis for Makhampom Bay, Thailand.



Annex I

WORKING DOCUMENTS

Table 1: Draft Table - Availability and Required Format of Data for Major Fisheries Issues.

Problem	Indicators/Information needed to detect problem:	Type, Unit and Frequency:	Temporal Requirements:	Spatial Requirements:	Available: ROK?	Available: CHINA?	Priority:	Transboundary?:
Decline in Commercial Fisheries	Current TAC for each commercial species	Allowable Catch Weight (greenweight kg, ton) per year/per season	Min 10 yrs, Ideal 30 yrs	Yellow Sea				
	Level of TOTAL CATCH for commercial species	Catch per area per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea				
	Historic Vs. Current TOTAL CATCH rates for each priority species		Over last 30 to 50 years	Yellow Sea				
	Carrying Capacity Models	Ton per fishery per region per annum	Min 15 yrs Ideal 50 yrs	Yellow Sea, reference area, Bohai Sea				
	Sustainable Yield Models	Ton per fishery per region per annum		Yellow Sea				
	Level of fishing effort, by method by area by year	CPU Effort per method per area per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea				
	Total Catch/Sustainable yield ratios for each commercial important species	Catch: sustainable yield per stock per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea				
	TAC/Sustainable Yield ratios for each commercial species	TAC: sustainable yield per stock per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea				
	Current Biomass levels for each stock	Biomass per Area (e.g. Kg per cubic meter)	Min 10 yrs Ideal 30 yrs	Yellow Sea				
	Historic Biomass levels	Biomass (Ton) per stock per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea				
	Target Biomass models for sites	Biomass (Ton)per stock per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea				

	Reference Site Biomass	Biomass (Ton) per stock per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea				
	Ratio of Historic vs. Current vs. Target vs. Reference-Site biomass	Biomass (Ton) per stock per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea, Reference Area				
	Number of assessed stocks (of high, medium or low value) about which stock status is known or unknown.	No. of stocks per value category per annum	Min 10 yrs Ideal 30 yrs	Yellow Sea				
	Fishing Distribution	Location, km2 per country per region per season	Min 10 yrs Ideal 30 yrs	Yellow Sea				
Unsustainable Mariculture	Change in extent of marine farms	M2 per region per annum	Min 25 yrs	All significant near shore marine farming areas				
	Change in area of habitats (%) covered by marine farms	M2 habitat per region per annum	Min 25 yrs	All significant near shore marine farming areas				
Harmful Algal Blooms (HAB's) and Emerging Disease	HAB Events	Frequency, location and species of toxic and non-toxic algal blooms per are per annum	Min 10 yr	Yellow Sea, South China Sea				
	Mortality of commercial species as a result of HAB's	Frequency, location and species of toxic and non-toxic algal blooms per are per annum	Min 10 yr	Yellow Sea				
	Current vs. historic rates of disease in mariculture	No. of new diseases per region per annum	No. per region per season	All significant near shore marine farming areas				

Table 2: Example Causal Chain Analysis for Major Fisheries Issues

Problem	Impact	Immediate cause	Underlying cause	Root cause	Governance analysis	Priority rank (H, M, L)	Trans-boundary?	If yes, priority rank (H, M, L)
-								
Fisheries Issues								
Decline in Commercial Fisheries	*Reduction in stock biomass*	Overfishing, over-exploitation of target species, un-controlled bycatch	Poor management and control of fisheries activities, unregulated foreign fishing vessels, monitoring and enforcement	Increase demand for marine resources due to rapid population and economic expansion	Poor or unsatisfactory legal instruments at the regional level, inadequate implementation of national regulatory instruments; lack of regional harmonization of regulations. Inadequate knowledge and infrastructure base	H	Y	H
Unsustainable Mariculture	*Damage to coastal infrastructure, damage to environmental quality, introduction of foreign species, emerging disease*	*Over-extensive and overly-intensive aquaculture activities*	Contamination of environment from activities, damage to surrounding habitats	Increase demand for marine resources due to rapid population and economic expansion	Poor or unsatisfactory legal instruments at the regional level, inadequate implementation of national regulatory instruments; lack of regional harmonization of regulations. Inadequate planning and management practices	M	Y	L
Harmful Algal Blooms (HAB's) and Emerging Diseases	*Stock loss, human health effects*	Eutrophication, environmental stress, over-intensive aquaculture	Contamination of pollutants and nutrients from aquaculture, industry, municipal waste, catchment use, coastal development and urbanization, improperly executed	Uncontrolled coastal development, Rapid population and urbanization	Inadequate planning and management practices	L	N	

			aquaculture activities		
Inadequate Capacity to Assess Ecosystem	*Incapacity to adequately manage activities and resources and mitigate effects*	Lack of information, environmental impact assessments	Inadequate knowledge and infrastructure base	Poor regional coordination, communication and collaboration, insufficient financing mechanisms and support	Lack of political will