

# Conclusions and recommendations

## Southwest Mexico

Pollution was considered to be the priority concern by the regional team. Microbiological pollution was found to have the most severe impacts due to its affect on the tourism industry and the health of the population. Untreated wastewaters from inland and coastal sources enter coastal waters where they degrade marine ecosystems, thus affecting tourism and the commercial fisheries. Some of the sub-system's important tourism beaches are the most polluted in Mexico resulting in the dissuasion of tourists. The contamination of surface- and groundwater has reduced the availability of freshwater for human consumption. Diseases associated with microbiological pollution are highly prevalent in the sub-system.

Sewer and treatment infrastructure, which is commonly dilapidated, has been unable to cope with the increasing quantities of wastewater produced by the booming coastal tourism industry and rapidly growing population. While regulatory agencies have made progress in controlling large volume industrial polluters whose wastes flow into federal waterways, they do not have the jurisdictional power to control municipal pollution sources. Technical and financial deficiencies often prevent local municipalities from developing and maintaining wastewater treatment networks.

### Recommendations

Near-term recommendations:

- Formulate and implement education and information strategies;
- Publicly rate municipalities for their level of compliance with wastewater treatment standards; and
- Rehabilitate existing, and construct new, wastewater treatment facilities.

Medium-term recommendations

- Introduce a fee-and-rebate system for municipal wastewater.

Long-term recommendations

- Create autonomous water districts; and
- Reform the pollution-related legal framework.

In conclusion, pollution abatement is a major challenge for Southwest Mexico. Increased understanding among public and policy makers of the causes and effects of pollution, the establishment of communication networks among the stakeholders of a river basin, the creation of incentives as well as penalties for polluters, and greater civil legal powers will shift the political situation in favour of environmental protection. A healthy environment will improve the well-being of the sub-system's population.

### Areas for further study

There is a general lack of information and data regarding wastewater management and the transboundary effects of water-related pollution in the coastal zone. This is presenting a significant obstacle to selecting and implementing appropriate policies. The following studies are recommended:

- Initiate studies to quantify the economic impact of coastal water pollution; and
- Conduct a survey of local public officials regarding their attitudes to pollution control.

## Central Equatorial Pacific sub-system

The countries of the sub-system are inextricably linked by hydrological processes. Water is a vector transporting not only a wide variety of valuable resources but also problems from one country to another. For example, deforestation in Nicaragua is affecting aquatic ecosystems in

Honduras, Guatemala and Costa Rica due to increased rates of erosion resulting in sedimentation downstream and in coastal areas.

Freshwater shortage and pollution were considered to be the most severe transboundary aquatic concerns in the Central Equatorial Pacific sub-system. Both concerns are interlinked as the discharge of untreated wastewater is contaminating surface- and groundwater, thus reducing the availability of water suitable for human uses. At the same time, population growth and economic development have led to increasing demand for water resources. Water availability per capita has declined by almost two-thirds between the 1950s and 1990s.

With the exception of Panama City, the other capitals and large cities depend primarily on groundwater supplies. In Managua, San José, San Salvador and the valleys of Choluteca and Tegucigalpa the level of groundwater abstraction is exceeding the natural recharge rate of the aquifers. Water supply infrastructure is not satisfying demand and is beset with operational and maintenance failures. Because water supply and sanitation services are subsidised, insufficient revenues are generated to maintain current and invest in new technologies, and the population has no incentive to save water.

These human dimensions to water availability are set against a backdrop of variable climatic conditions throughout the sub-system, with some parts of the region suffering from intense periods of drought with a marked reduction in river flow. The intensity of rainy periods and the severity of droughts are expected to increase in the future. Water scarcity will depress the agriculture sector, the cornerstone of the sub-system's economy, increasing unemployment and migration, and causing food insecurity. Tourism, an increasingly important industry, will also be severely impacted by water shortages.

Municipal wastewater is the major source of pollution in the sub-system; 95% is discharged without treatment. Only 60% of the population has access to sanitation services, which are frequently latrines. ADD and other water-related diseases are the main cause of the high rates of morbidity and mortality in the sub-system.

The root causes of this situation include deficient environmental policies, institutional failures, biased sectorial approaches, resistance to change, the use of obsolete technology, outmoded regulations, and the lack of inter-institutional integration and stakeholder consultative processes.

## Recommendations

In order to address pollution in the coastal areas of the Central Equatorial Pacific sub-system, a first step would be the implementation

of regional instruments of cooperation such as the Plan of Action for the Protection of the Marine Environment and Coastal Areas of the North East Pacific. The institutions responsible for the management of water and the control of pollution were found to lack administrative and organisational capacity. The selected policy options, therefore, address these institutional inadequacies as a prerequisite.

In the case of freshwater shortage, the following policy options are recommended:

- Develop and implement environmental awareness programmes; and
- Reorganise the water sector.

In the case of pollution, the following policy option is recommended:

- Develop and implement environmental awareness programmes.

## Pacific Colombian sub-system

Unsustainable exploitation of fish and other living resources was selected as the priority concern of the Pacific Colombian sub-system. The current level of exploitation is unsustainable; stocks of some traditionally targeted species and coastal shellfish have been depleted. Freshwater commercial species are also less abundant today. The fishing industry tends to target a limited number of species which are valuable on the international market. Despite stocks of these species becoming exhausted, total catches have been maintained or even increased as fishermen are targeting more abundant species in order to sustain their income levels and food security. This has been achieved by the use of new technologies which allow fishermen to exploit stocks which are further offshore in deeper water. They are also using non-selective and destructive fishing gear to increase short-term profits at the detriment of fish stocks and marine ecosystems. It is weak enforcement rather than a lack of laws and regulations that is allowing domestic and foreign fishing fleets to operate illegally. The various institutions responsible for fisheries management inadequately cooperate and fail to involve stakeholders in the decision making process. The lack of fisheries statistics prevents managers from having an accurate understanding of the state of the fisheries.

Colombia has developed several programmes aimed at addressing the environmental problems affecting its Pacific coast, such as Pacific Agenda 21 and the Project Biopacifico. The policy options proposed in this report should be considered as complementary actions to those recommended in these initiatives.

## Recommendations

The analysis of the policy options established that under current conditions of environmental management and governance the most feasible option for implementation is:

- Enhanced information management and education programmes.

Following the implementation of the above option, which would result in direct benefits for the management of natural resources, it is also recommended to implement the option:

- Strengthen the self-regulation of coastal communities.