

Background

The livelihoods of the 60 million people who live in the Lower Mekong Basin (LMB) are closely linked to the ecological health of the river and its tributaries. The future well being of these people depends on the Mekong continuing to yield the variety of and abundance of aquatic resources on which they rely.

The condition of the river, which is at present in reasonably good ecological health, must be maintained if these benefits are to persist in the long-term. Monitoring the ecological health of the river will help recognise changes in the condition of the river's environment in due time to take remedial action.

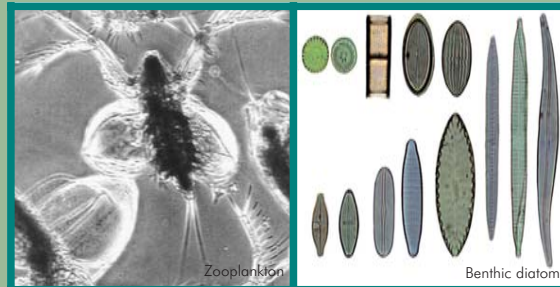
This Mekong River Report Card on Aquatic Ecological Health provides an overview of the ecological health of the Mekong River. It is based on an evaluation of particular animals and plants that are recognised as being indicators of environmental health. The analysis is based on a programme of research undertaken by the Mekong River Commission from 2004 to 2007. The data was taken from 51 sampling sites across the basin from northern Lao PDR to the Mekong Delta.

Box 1: Average Tolerance Score per Taxon (ATSPT)

A scoring system is used to evaluate and compare the monitoring sites. Each site in the MRC biomonitoring programme was assigned a Site Disturbance Score (SDS) within a range of 1 (little or no disturbance) to 3 (substantial disturbance).

Based on the SDS in each site and the proportion of taxa in those sites, each taxon was assigned a tolerance score, that relates to its tolerance to pollution. The Average Tolerance Score Per Taxon (ATSPT) is simply the average of the tolerance scores of all taxa in a particular site, and provides an indication of how disturbed that site is.

A high ATSPT may indicate harm to the ecosystem, as only tolerant taxa survive under these disturbed conditions.



Srepok River, Cambodia



Mekong, Luang Prabang, Lao PDR



Mekong, Chiang Saen, Thailand

Box 2: Reference sites in the Lower Mekong Basin

There are 14 reference sites in the Lower Mekong Basin. These sites show little disturbance from human activities. The populations of plants and animals at the sites are in their natural state. Biodiversity is high and species that are sensitive to pollution are common.

For further reading

MRC (2008) Biomonitoring of the lower Mekong River and selected tributaries, 2004 – 2007. MRC Technical Paper No 20, Mekong River Commission, Vientiane.



Srepok River, Viet Nam



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This publication reflects the views of national experts and does not necessarily reflect those of all Member Countries



The Mekong River Report Card on Aquatic Ecological Health (2004-2007)

DECEMBER 2008

The Report Card

This Report Card describes the aquatic health of the Lower Mekong Basin. The assessment is based on the work of a team of biologists and ecologists from the four MRC Member Countries and is the conclusion of field work and analyses undertaken during the period from 2004 to 2007.

The map shows the location of the 51 sites along the Mekong and its major tributaries that were investigated during the survey period. The sites were chosen to provide a broad geographical coverage. They also cover a wide range of river settings and environments. These include rock-cut channels in northern Lao PDR and northeast Thailand, through the alluvial channels and floodplains of southern Lao PDR and Cambodia, to the distributary system of the Mekong Delta in Cambodia and Viet Nam.

The sites also exhibit varying degrees of disturbance from human activities. Some are located in or close by human settlements, some are next to fields where crops are grown and livestock graze, some are upstream or downstream of dams and weirs, and at some there is moderate to heavy river traffic.

To provide a geographic reference, the map locates the sites within the 'sub-areas' defined by MRC's Basin Development Programme. By-and-large, each of these sub-areas (which broadly equate to the major catchment areas in the Lower Mekong Basin) is characterised by similar physiographic character and river setting.

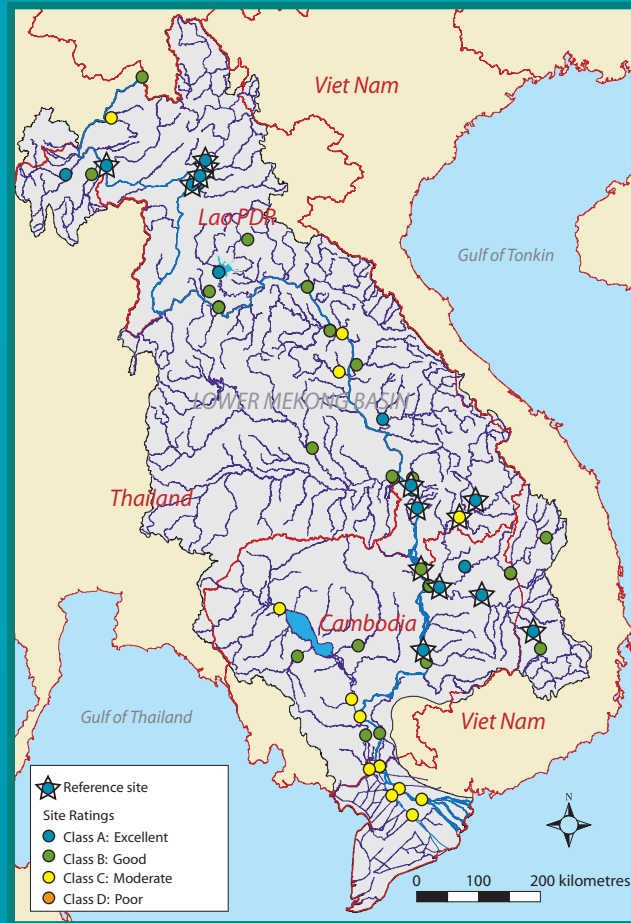
On the map, the sites are colour-coded according to how the biota at that site compares with guidelines established at a set of 'reference sites'. These reference sites are chosen because they represent sites with the least disturbance caused by human activities.

Reference Sites

Reference sites (the stars on the map) provide a 'baseline' from which the other sites can be measured. They were chosen from the 51 survey sites and were defined by the following criteria:

- pH between 6.5 and 8.5 at the time of biological sampling.
- Electrical conductivity (EC) less than 70 mS/m at the time of biological sampling.
- Dissolved oxygen concentration (DO) greater than 5 mg/L at the time of biological sampling.
- An average site disturbance score, representing human disturbance at the site, of between 1 and 1.67 on a scale of 1-3 (that is, within the lowest one-third of possible scores).
- An absence of major dams and cities within 20 km upstream of the site (downstream development was also considered where a site has upstream flow because of tidal influence.) A flow regime not affected by inter-basin transfer.

Fourteen of the 51 sites met all of these criteria (see box 2).



Class	Rating criterion	Characteristic features
A: Excellent	10–12 out of 12 indicators meet guidelines	Level of biodiversity is the same as reference site conditions. Species composition is dominated by taxa that are sensitive to pollution. Ecological capacity of the river to support production of fish and other biological products within the range of capacity of the reference sites. Minimal disturbance from human activities.
B: Good	7–9 out of 12 indicators meet guidelines	Level of biodiversity slightly reduced from reference site conditions. Species composition has many taxa that are sensitive to pollution. Ecological capacity of the river to support production of fish and other biological products slightly below the range of capacity of the reference sites. Some disturbance from human activities.
C: Moderate	4–6 out of 12 indicators meet guidelines	Level of biodiversity is notable less than under reference site conditions. Species composition is a mixture of taxa that are sensitive to pollution and that are tolerant to pollution. Ecological capacity of the river to support production of fish and other biological products moderately below the range of capacity of the reference sites. Some impacts from human activities.
D: Poor	0–3 out of 12 indicators meet guidelines	Level of biodiversity significantly altered from reference site conditions. Species composition dominated by taxa that are tolerant to pollution. Ecological capacity of the river to support production of fish and other biological products far below the range of capacity of the reference sites. Several negative to extensive adverse impacts from human activities.

Biological Measures

Biological criteria, such as the type, abundance and diversity of animal and plant life, are used to monitor the environmental health of river systems world-wide, and biomonitoring has become a widely accepted method for gauging the impact of human activities on ecosystems and aquatic resources.

The Mekong River Basin contains one of the richest and most diverse biota of any river system in the world. This biodiversity, coupled with the dependency of the basin's people on aquatic animals and plants to provide their livelihoods, makes biomonitoring a particularly good tool for monitoring the ecological health of the Mekong River system.

However, the animal and plant life of the Mekong is as yet relatively poorly understood. Therefore, the MRC undertook a pilot programme to evaluate which groups of animals and plants were best suited for biomonitoring purposes and what were the most appropriate criteria to record.

Four groups were chosen: (i) benthic diatoms (microscopic algae attached to a substrate), (ii) zooplankton (microscopic animals that float or drift in river water), (iii) benthic macroinvertebrates (animals such as insects, snails and worms that live on, or in, the river bed), and littoral macroinvertebrates (animals such as insects, snails and worms that live in shallow water at the shoreline of rivers and lakes).

These groups of animals and plants are responsive to a range of stresses caused by human activity, are identified easily and quickly, and can be collected and analysed without difficulty and inexpensively.

Assessing the Impacts of Human Activity

The Report Card assesses impact of human activity at individual sites by comparing specific characteristics of the four animal and plant groups at the site with 'benchmark values' recorded at the reference sites.

Three characteristics were measured: richness (number of species or species groups); abundance (number of individuals); and Average Tolerance Score per Taxon (animal or plant group) (ATSPT) (see box 1).

The average value of each of these characteristics at the 14 reference sites was used to define the guideline 'benchmark baseline' (see table opposite). The more guidelines met by a site, the better the conditions in that site.

As there were four animal and plant groups and three characteristics, each site was judged against 12 of these guidelines. Each site was classified according to the number of these guidelines met.

Of the 51 sites, 16 fall in Class A, 22 in Class B, and 13 in Class C. None were classified in Class D. Overall the results show that most of the ecosystems in the lower Mekong River and its major tributaries have not yet suffered great harm resulting from water resource developments and waste disposal.

