2.4 IMPACTS AND COSTS OF LOST ECOSYSTEM SERVICES

What's in this chapter

- Quantitative impacts and costs associated with lost ecosystem services
- Key services being impacted are water resource availability, water quality, sedimentation, flood control and air quality (due to fire and haze)
- The actual and potential severity of economic impacts associated with declining ecosystem services

The previous chapter has described the sometimes complex relationship between different sectors of the economy and natural capital and the effects on people's well-being. An important, though unfortunate, aspect of this relationship has been the negative impacts of economic growth on HoB's natural capital and declining ecosystem services. For example, the case of logging illustrated how over-extraction can provide short-term profits while causing production and profits to decrease in the long term. In addition to resource depletion, unsustainable extraction has impacts on the capacity of an ecosystem to provide services such as maintaining the hydrological cycle, preventing soil erosion and river sedimentation.

This chapter focuses on impacts and costs due to reduced or lost ecosystem services. It describes a range of negative impacts on ecosystem services, including reduced water availability, declining water quality, river sedimentation, flooding, and related negative impacts of land conversion such as haze and fire. As discussed in the previous chapter, there is not a 1:1 relationship between damages and sectors; instead, many of the costs / damages described below emanate from the cumulative impacts of multiple sectors. The impacts described below will only worsen if the HoB's ecosystems and biodiversity continue to degrade. As ecosystem services become impaired, costs to businesses, governments and individuals will increase. Finally, it should be noted that the figures presented here are partial and preliminary and should serve as a basis for further refinement.

Changing water resource availability

HoB ecosystems are an important source of downstream water supply through replenishment of groundwater and surface water bodies to towns and cities as well as for industrial activities. An important and related ecosystem service consists of regulating the availability and timing of water supplies downstream.

The impact of deforestation on annual and seasonal water yield is the subject of ongoing research and debate. In general, studies suggest that deforestation leads to an increase in total annual water yield downstream; this is because natural, intact forests consume more water through evapotranspiration than most other land uses. However, deforestation and soil compaction can cause significant changes in seasonal water availability and decreased groundwater recharge, resulting in a decreased base flow in the dry season.

Households are experiencing water shortages and being forced to acquire water from costly alternative sources.

Deforestation and forest degradation in upper and midstream ecosystems in the HoB have already begun to affect seasonal water availability for downstream population centres and industrial activities. Households are experiencing water shortages and are being forced to acquire water from costly alternative sources (see Box 2.2). Local examples include a water utility in Sanggau (West Kalimantan) which had two of its water springs (Bron Engkayas and Bron Ensilup) dry up in the dry season due to expansion of palm oil plantations[101]. In the dry season, water utilities in Banjarmasin (South Kalimantan) and Pontianak regularly implement rotational distribution, whereby access to water is rotated among the various areas to which water is distributed, restricting access to specific timeslots during the day.

At the moment, no real costs are being expended by water utilities in order to ensure a reliable water supply. Although modeling results are not available to provide further insight into the causes of a decline in base flow, it is possible to estimate the cost to society. For the three main river basins of Kalimantan, the cost of building reservoirs to create a water buffer is estimated at US$10 million (see Box 2.2).

Local inhabitants are impacted most by a potential decline in water availability, as they face price increases of 50 per cent to purchase water from private vendors in the dry season. As a result, an average family needs to spend US$30 per month, or about one third of its monthly income, to purchase clean water in case of water shortages.

Box 2.2: Estimated cost of decline in water flow during the dry season

Value of water supply from HoB for water utilities and those connected to water distribution network

Water utilities in Kalimantan have noticed a declining base flow of the river during the three driest months of the year. This results in water shortages. Inhabitants that are not connected to the piped water distribution network are facing price hikes by vendors during the dry season. An analysis using InVEST found that a large proportion of water in three of Kalimantan's major river basins originates in the HoB – 55 per cent for the Mahakam, 40 per cent for the Kapuas Barito, and almost 60 per cent for the Kapuas. A change in land use in HoB consequently changes the hydrograph of these rivers, resulting in decreasing water availability downstream during the dry season.

Several water utilities are already being forced to ration water during the dry season. To prevent this, companies must either find alternative sources of water or create a reservoir for freshwater storage. Water utilities in these three river basins supply 180 million m^3/year of water to meet current demand.

Water utilities and inhabitants would face substantial costs in the event of even a five per cent shortage in water supplies during the dry season. Shortages of this scale would require freshwater storage capacity of 2.3 million m^3 simply to meet current water demand. The cost of constructing a reservoir to meet this demand is estimated at US$ 5 per m^3 or over US$10 million altogether. This figure does not account for the additional costs of land acquisition, operation (pumping costs) and maintenance or the construction of pipelines and pumping stations to connect the reservoir to the distribution network.

Value of water supply from HoB for inhabitants that are not connected to water distribution network

Only 50 per cent of Kalimantan's inhabitants are connected to a water distribution network. The other 50 per cent extract water from wells, surface water or buy water from vendors. If wells and surface water become unreliable sources, they will have to resort to water from vendors and water delivered in trucks. Private water vendors sell water at IDR 300,000/ m^3, but prices often increase by 50 per cent in times of shortage, up to 450,000 IDR/ m^3 (US$50/$m^3$). If 5 per cent of the inhabitants that do not have a house connection have to purchase water for consumption and cooking (15 l per inhabitant/day) through a private vendor in the dry season, this would lead to a total additional cost of US$3.9 million/year, to be borne by individuals. For one affected family, this would mean an additional household expenditure of US$30/month during the dry season; this is a substantial sum, given that the average income in Kalimantan is around US$100/month[102].

As the two examples above indicate, both water utilities and individuals have a clear financial interest in maintaining hydrological functions within the HoB landscape.