

# Damage Schedule - an Alternative Approach for Valuation of Coastal Resources

*Grille de déprédation - une nouvelle approche à l'évaluation des ressources côtières*

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Valuation of natural resources and environmental assets is a key aspect of successful resource management. In complex systems such as those of coastal areas, decisionmakers usually face the conflicting issues of resource use and environmental damage. Knowing the values of the resources could improve and facilitate decisionmaking. Unfortunately, valuing natural resources is difficult because there are no observable market prices for many resource uses.

*L'appréciation de la valeur des ressources naturelles et du patrimoine environnemental est un élément fondamental dans la gestion rationnelle des ressources. Dans des systèmes complexes comme les systèmes littoraux, les instances décisionnelles sont régulièrement confrontées aux problèmes conflictuels que posent l'utilisation des ressources et la dégradation de l'environnement. Connaître la valeur des ressources contribuerait à améliorer et à faciliter la prise de décisions en matière d'aménagement. Malheureusement, cet exercice d'évaluation n'est pas sans présenter des difficultés du fait de l'absence de cote de marché observable pour beaucoup de types d'utilisation de ressources.*

## Valuation Techniques

There are two main approaches to valuation of natural resources; one is based on market information and the other is non-market based. Under the first approach, techniques such as changes in productivity are easy to apply and very useful where physical changes in resource production can be measured. Various assumptions may be needed to reduce the complexity caused by the linkages among many components of a resource system before the physical changes due to a certain activity or event can be identified. Despite their usefulness, methods using this approach do not yield clear indications of the values of resource uses for which market prices do not exist.

The contingent valuation method (CVM) is one of the techniques aimed at capturing the

non-market values of resources. Because CVM is a survey-based method, it faces other kinds of problems relating mainly to the way questions are asked and the biases associated with questionnaires. This method asks willingness to pay (WTP) questions which are a measure of gain, rather than willingness to accept (WTA) questions which measure losses, based on the assumption that the two measures are equivalent. However, recent research has provided strong evidence suggesting that the equivalency assumption is not valid because people tend to value losses much more than they do gains (Knetsch 1994).

### Valuation Without Values: the Damage Schedule Approach

Realizing the problems associated with current methods of assessing non-market resource

values, the damage schedule method is proposed as an alternative approach. This new method aims at providing a comprehensive understanding of natural resources and environmental assets in terms of their relative importance, without directly measuring their values. The proposed strategy involves setting up a schedule for the damages resulting from various activities or events that adversely affect different resources — an empirical test of Knetsch's "interim damage schedule" (Knetsch 1994).

A damage schedule is constructed using experts' judgement of the relative importance of various changes or degradation in natural resources and the environment as a consequence of particular activities or events. Experts include both formal experts such as researchers in various science disciplines, social sciences and economics, policymakers,

and lay experts such as users of the resources. The paired comparisons method is used to present objects in pairs to be judged. A ranking of scores indicating the relative importance of all activities considered is obtained as a result of paired comparisons analysis. This is then used as the basis for constructing a damage schedule.

The basic assumption underlying this approach is related to the fact that people tend to agree more on relative values than they do on absolute values. Some studies using the paired comparisons method to indicate the values of natural resources show consistency in individual rankings (Rutherford 1995; Peterson and Brown, unpubl. data). In addition, it is far easier to compare and subjectively judge the severity of two events than to perform a thorough quantification of the changes in productivity they would induce.

An attractive feature of the damage schedule is that it can be constructed quickly and rather cheaply. This is important when

dealing with accidents such as oil spills. Traditionally, economic valuation of resource damage is performed after the accident has occurred and usually involves long processes of collecting information, identifying impacts, and calculating costs of restoration or replacement. Hence, not only are absolute value assessments problematic, but the cost of assessing the damages could easily exceed the recovery cost of the resource itself.

The damage schedule approach provides decisionmakers with a new tool for management of natural resources and environment. It can be used to prohibit, restrict, or discourage activities or development projects that endanger, or are considered to be a threat to, the health of ecosystems. Fig. 1 shows an example of how the damage schedule can be used to design policies.

Note that where it is appropriate to use compensation schemes or to assign user fees, some options are available, such as the use of

arbitrary values, or values derived from existing studies. In either case, policymakers can be confident that the correct incentive is proposed to resource users based on the damage schedule.

### Case Study of Thai Coastal Areas

The damage schedule approach is being tested, using coastal areas of Thailand as a case study. Two coastal areas, Ban Don Bay (BDB) and Phangnga Bay (PB), were selected because information on the coastal environmental profile of the areas is available (Paw et al. 1988) and a field survey is being carried out to update some of the information, in particular that related to resource status and coastal activities. The coastal transect of both areas, as described by Silvestre and Cruz-Trinidad (unpubl. data), is also used to provide a schematic approach for constructing a matrix indicating important resources and activities in the study areas. This matrix is a basis for developing the questionnaire that will be used to rank the relative importance of the coastal resources of BDB and PB.

Ban Don Bay is a small, open bay area in the Gulf of Thailand, on the east side of the southern coast, with shallow water and soft, muddy substrate. Important resources in BDB are mangrove forests, coral reefs, and fisheries. Coastal activities include shrimp farming, shellfish culture, fishing, and tourism. The bay has undergone a dramatic change in land-use patterns during the past 10 years. The area used for shrimp ponds has increased from 22 km<sup>2</sup> in

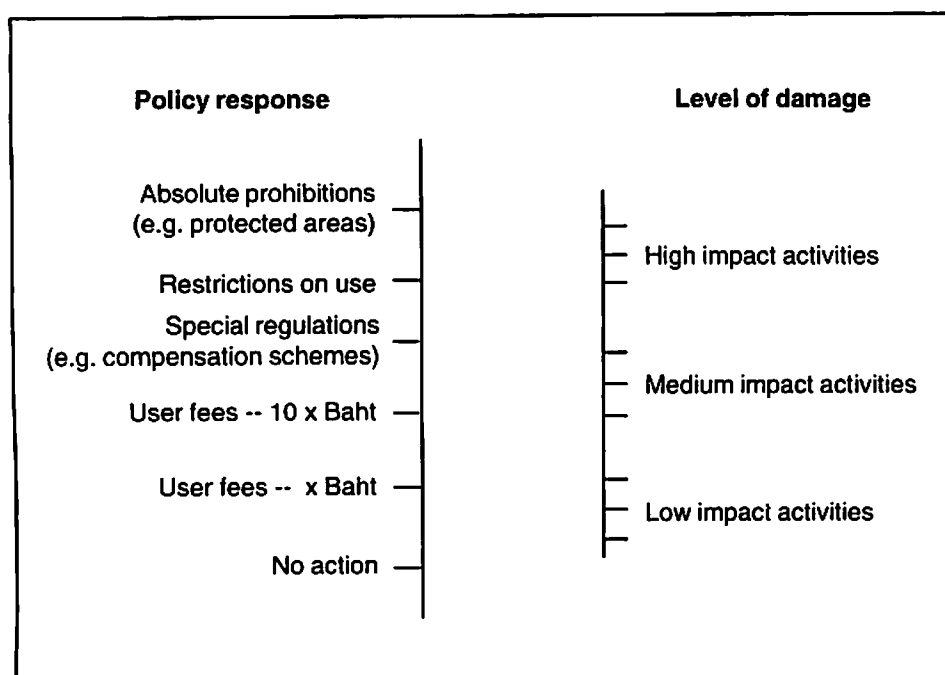


Fig. 1. Assigning policy responses to damage rankings (adapted from Rutherford 1995).

creased from 22 km<sup>2</sup> in 1984 to 65 km<sup>2</sup> in 1993. This expansion of shrimp farming areas has caused some adverse impacts on the coastal environment since it involves conversion of mangrove forests in the area. In terms of fisheries, destructive fishing methods such as trawl fishing and purse seine fishing, are prohibited during the spawning season of mackerel (*Rastrelliger* spp). Although government enforcement is not effective, coastal communities are supporting a self-regulating system that seems to be working to a certain extent. The other important activity is related to tourism. The coastal areas of Samui and Phangan islands in BDB are rapidly being developed to support the growth in this industry. The coral reefs of these islands, including those of Ang Thong National Park, have been destroyed or seriously degraded due to tourist-related activities, such as boating, snorkeling, and illegal collection of corals.

Phangnga Bay is a large, semi-closed bay area in the Andaman Sea, on the southwestern coast of Thailand. There are many small islands in the bay that protect the shore. The resources of PB are similar to those of BDB except that most of the mangrove forests in the area are protected under a national conservation program. Shrimp farming, although a growing activity, does not always encroach in the mangrove areas. Instead, there is an increasing trend of converting rubber and oil-palm plantations into shrimp ponds (Fig. 2). Cruz-Trinidad (1994) shows that shrimp farming in upland areas could reduce the value of production land due to seepage of salt-water in ground aquifers. Phangnga Bay also faces a rapid growth in tourism and conse-



Photo by Rattana Chuenpagdee

Fig. 2. Shrimp farming in a rubber plantation area, Thailand – an activity that could result in the reduction of freshwater availability for agricultural purposes.

quently the development of coastal areas into hotels, resorts, and bungalows. Tin mining is no longer active in PB because of the sharp drop in tin prices. Instead, the area is being developed to support the expansion of heavy industries, such as oil refineries, which might come as a result of a proposed plan for construction of the southern seaboard project in Krabi province. Consequently, the probability of oil spill occurring in the PB area could become greater. Fishing activity, on the other hand, has been well managed by the coastal communities and the local nongovernment organizations. The number of trawlers in the bay area has significantly decreased during the past few years.

The various activities in both BDB and PB have some adverse impacts on natural resources and the environment. These impacts are difficult to assess because of the complexity of the coastal resource system. It is hoped that, with the use of the damage schedule, a comprehensive understanding of such a system and its values can be obtained.

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#### Further Reading

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