Changing Ecological Assessment and Mitigation in Japan

AKIRA TANAKA, Ph.D.

Traditional EIA procedures in Japan did not include ecological assessment — only inventories of flora and fauna. This has led to unnecessary habitat loss. But two case studies highlight both the problems and solutions. The need to sequence ecological mitigation measures is emphasized.

Traditional EIA Systems and Ecosystem Management

The goal of this paper is to review traditional EIA procedures, to highlight the major issues raised by those procedures, and to identify a future agenda in terms of ecosystem management in Japan.

Environmental impact assessment in Japan, particularly ecological assessment, is changing as a result of the EIA law which came into force in 1999 and, more importantly, because of accumulated questions raised by traditional ecological assessment systems. Before the EIA law enforcement, the National 1984 Administrative Order on EIA System had been considered the standard EIA procedure in Japan. I would like to draw attention to two particular problems with the 1984 order.

First, generally speaking, when environmental 'impacts' are 'problems', 'mitigation measures' should be 'solutions'. Thus mitigation should be considered as a sequel to an EIA study. However, neither the definition nor importance of mitigation were clearly regulated in the 1984 order. Proposed mitigation measures in EISs were not meaningful, nor were they in any way comprehensive - they were there in name only. Therefore little improvement of a proposed development plan could be expected.
Consequently, EIA has been considered simply as a cost for developers, a name only for environmentalists, and a task which consultants conducting EIA studies carried out with something of a guilty conscience. This is the primary problem of traditional EIA systems in Japan.

Secondly, under traditional EIA orders, 'ecosystems' did not have to be studied as a part of an EIS. Only 'flora' and 'fauna' - that is inventories of identified species - were included in EISs. This was because quantitative assessment methods for ecosystems had not been developed although many people were aware of the importance of

ecosystem approaches at that time. Consequently, inventories of important species were described in EISs and developers and consultants had only to try to relocate these species rather than protect the habitats.

When important species were identified through EIA surveys, typical excuses described in EISs were that since there were many other habitats for the species around the proposed development site, there was no significant impact on the species; or, since the identified plants/animals would be transplanted to adjacent areas, there was no impact. But, developers do not have any responsibility to protect adjacent areas and these areas are going to be developed by another developer sooner or later.

In Short, traditional EIA has not been effective in conserving natural ecosystems and as a result natural ecosystems have continuously been destroyed (Tanaka, 1996). One of the main reasons for this has been the lack of provision for compensatory mitigation measures.

Ecological mitigation measures should be proposed firstly to avoid impacts, secondly to minimize impacts, and finally compensate for impacts. When a development project is inevitable, loss of both the areas and function of the ecosystems on the development site is inevitable, too. Therefore compensatory mitigation measures are essential as a part of the conditions under which a proposed development is allowed to go ahead.

The purpose of ecological compensatory mitigation is to compensate the loss of habitats that will be destroyed by development projects by a process of restoring/ creating/enhancing/preserving habitats. This must be the key for future ecological assessment in Japan.

Case Studies of Ecological Compensatory Mitigation

Here I would like to introduce two particular cases of ecological assessment in order to identify the current status of compensatory mitigation in Japan (figure 1).

Trans-Chugoku Highway Construction Development

The National Trans-Chugoku Highway development was proposed to connect the north and south of the Chugoku Region by the construction of a new highway. The ElS for the development was submitted in 1985. Since the development is a national one, the

EIA study was guided by the National 1984 Administrative Order on EIA System. According to the EIA order, the EIA consultants could use data from existing reports and did not have to carry out a field survey to analyse baselines for the EIS. Therefore an ecological field study was not conducted for the 1985 EIS. An ecologically important wetland of 489 m^2 existed on the route of the proposed highway. However since there was no existing report that identified the wetland, the EIS did not do so either.

The wetland was discovered during construction in 1993. A local environmental NGO requested the developer to protect the wetland. The developer, the Japan Highway Public Corporation, voluntarily organized an environmental committee to determine possible mitigation measures on condition that the route would not be changed because other parts of the highway construction had already been completed. After the four-year studies and discussions at the environmental committee, a compensatory mitigation measure was proposed. The proposal for compensatory mitigation was to replace the wetland in an area adjacent to the highway and to preserve an existing wetland area that was located along the highway. Replacement means the creation of an ecologically-similar wetland in another place. According to the mitigation plan, the original area of the wetland was 489 m^2 and the replaced wetland area including preserved wetland area was 2244 m^2 in total. The initial replacement construction and planting was conducted during 1994 and 1995. After that, ecological succession has been monitored.

This mitigation was an on-site, in-kind, off-time (after the development construction) compensation. This is the first case where the project proponent secured terrestrial land and tried to implement compensatory mitigation in Japan. This far-sighted mitigation was implemented on a voluntary basis on the part of both local environmentalists and the project developer. The mitigation measures, success criteria, and follow-up activities were not presented in the original EIS. If local environmentalists had not been informed of the discovery of the wetland, the mitigation might not have been implemented.

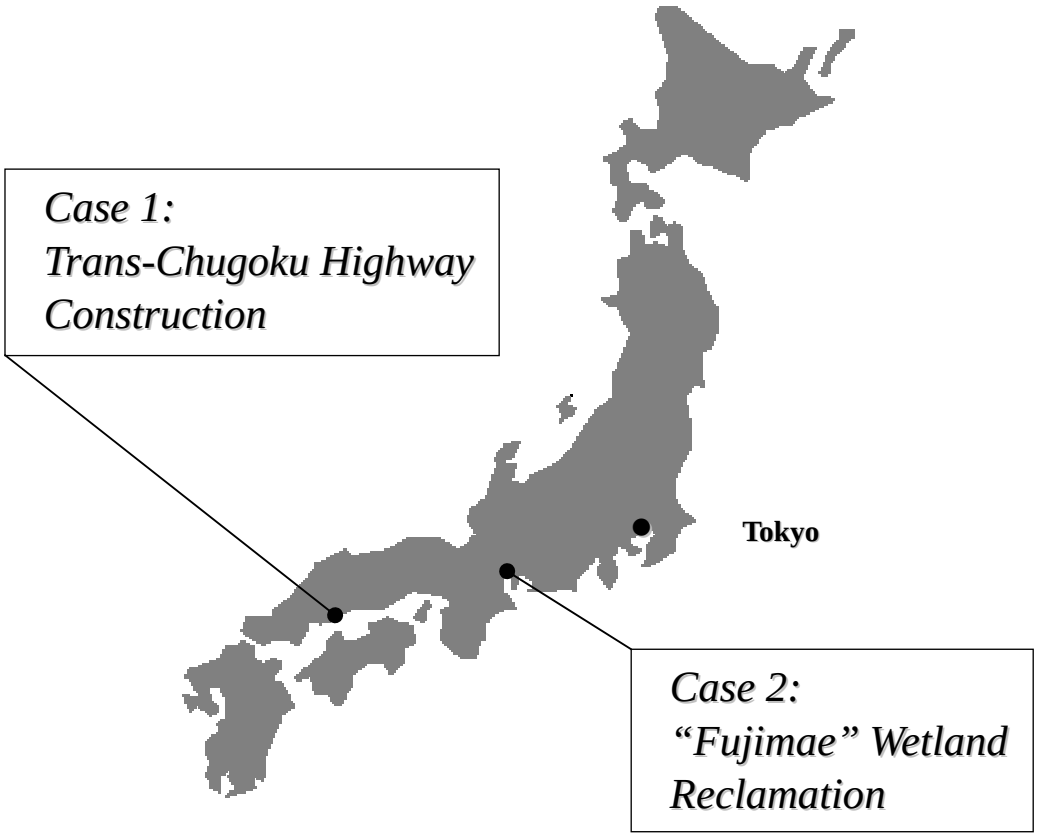

Figure 1. Location of the development plan

'Fujimae' Wetland Reclamation Plan for Waste Disposal

Nagoya City, one of the largest cities in Japan, decided to landfill 46.5 ha of tidal flat mud wetland for waste disposal in the Fujimae, which is located on the south coastline of the city. An EIS of more than 1000 pages, which suggested that any ecological impact would be very slight, was submitted in 1996. However the tidal mud flat is a threatened ecosystem because of the many reclamation projects for the creation of industrial areas, and the Fujimae wetland is one of the most important wetlands for bird migration in Japan. So the EIS met with strong opposition from environmental NGOs, citizens and the EIA committee of the city, and it became an international issue.

Nagoya City then proposed to create a new 40 ha wetland, by elevating an existing deeper wetland area, as compensation for the loss of habitat that would occur as a result of the landfill. But the compensation proposal met with strong opposition, again from public opinion and also from the Environment Agency. The main reasons for opposition were:

1. the compensation project area was itself a good deeper wetland ecosystem;
2. technologies for tidal mud flat creation were not well established;
3. the compensation plan was proposed without any consideration of avoidance or minimization of the need for mitigation.

Finally Nagoya City withdrew the Fujimae reclamation plan and, in 1999, started to consider more substantive waste management programmes including and grading garbage.

The Fujimae wetland is one of the most precious wetlands in Japan but it was not designated as a preserved area. This is not a problem of EIA systems but of land-use planning/environmental planning, and this is the most critical issue of environmental policies in Japan. The mitigation plan was an on-site, in-kind, on-time (at the same time as the development construction begins) compensation. In the EIS, there were huge amounts of surveyed data but little relating to assessing the loss and gain of the habitat, i.e. quantitative analytical data for the compensatory mitigation. This time, Nagoya City could 'avoid' direct impact on wetlands by selecting a 'no action' decision in spite of their original intention. However, sooner or later Nagoya City will need a 1andfill site for waste and at that time, they must confront 'minimization' and 'compensatory' mitigation. Development of both mitigation guidelines on sequencing such as 'avoid-minimize-compensate for' and quantitative ecological assessment methods is crucial.

Two Major Issues of EIA for Ecosystem Management in Japan

As mentioned above, existing natural ecosystems have been continuously destroyed by new development projects in Japan. Consequently, ecological compensatory mitigation is being considered as a tool to conserve regional ecosystems. In the 1997 EIA Law, the importance of ecological mitigation proposals in EISs is clearly expressed and a concept of 'compensatory mitigation' is also introduced. In addition to 'flora and fauna' in traditional EIA systems, 'ecosystems' became a part of EIA studies and of EISs. Based on the above circumstances, there are two major issues for future ecological assessment in Japan.

Sequence of Mitigation Measures

According to the 1997 EIA law, compensatory mitigation can be introduced when it is considered necessary. This is a problem. Because the 1aw is applied only to 1arge-scale national projects, most if not all of these projects must have significant impacts on ecosystems. However, some projects implemented by local governments and the private sector may have significant impacts on the environment, and the national law cannot be applied to them. (Most prefectures have their own EIA regulations to cover non-national projects.) It is rational to suppose that there will be some impacts on local ecosystems, as long as the proposed national project is permitted. The Fujimae wetland development, which was a local government project, was avoided. But it is one of the very rare cases in Japan in which a proposed governmental project was not implemented for environmental reasons. Very seldom has 'No action' been applied to national projects. Therefore compensatory mitigation should be an obligation in all cases where a proposed project is permitted. The magnitude and type of compensatory mitigation activity should be discussed in terms of the circumstances.

After the 1997 EIA Law was enacted, many development projects including non-national projects tend to consider ecological restoration/creation as compensatory mitigation. But many of them cannot be considered as compensatory mitigation because neither substantial efforts of 'avoidance' nor 'minimization' were shown in the EISs prior to 'compensatory mitigation' proposals. A compensatory mitigation project could be an 'excuse' for environmentally unsound development. Therefore it is crucial to prepare mitigation guidelines that regulate the sequence and definitions of mitigation such as '1. avoidance; 2. minimization; 3. compensatory'. And any compensatory mitigation measure should be reviewed to ascertain whether or not the compensatory action was proposed after examination of 'avoidance' and 'minimization'.

Quantitative Ecological Assessment and HEP

Making inventories of flora and fauna is not enough to protect them. It is essential to secure substantial habitats in space and time. While, as mentioned above, some compensatory mitigation measures have been proposed in Japan, there has been no quantitative analysis for ecosystem assessment. It is time to progress in ecological assessment by moving from the traditional qualitative species approach towards a

quantitative ecosystem approach.

Habitat Evaluation Procedure (HEP) is one of the most holistic approaches for ecological assessment, which satisfies all the requirements mentioned above. HEP evolved from an assessment method developed in Missouri in 1974 and it has been modified several times by US Fish and Wildlife Services.

HEP is a species-habitat approach to ecosystem assessment, and habitat quality for selected evaluation species is documented with an index, the Habitat Unit (HU). The HU is derived from quality of habitat, which in turn is defined by a Habitat Suitability Index (HSI) and the total area of available habitat as the index of quantity. The value of HSI, Which ranges from 0.0 to 1.0, is derived from an evaluation of the ability of key habitat components to supply the life requirements of selected species of fish and wildlife. (U.S. Fish and Wildlife Services, 1980) Using HEP, not only loss of habitats (i.e. impacts) but also gain of habitats (i.e. compensatory mitigation) can be evaluated both qualitatively and quantitatively.

Figure 2 shows a conceptual diagram of HEP. The left-hand part of the figure shows changes in HU at a hypothetical development site for waste dumping while the right-hand part shows changes in HU at a compensatory mitigation site (i.e. restoration site) adjacent to the development site. PA1, PA2, and MP1, MP2 are HU of each year. For example, HUs of PA2 reduced sharply because of deforestation and excavation of pit for waste dumping. When filled to capacity, Pa2 rises sharply because the surface is covered by topsoil and revegetated during concentrated maintenance period. After the maintenance period, PA2 rises gradually as the habitat recovered naturally. We can define quantities of both 'net loss' and 'net gain' by subtracting HU values 'without project' from HU value of 'with project'. In conclusion, HEP allows us to review the balance between impacts and compensatory mitigation measures.

HEP is considered the most comprehensive among more then 200 ecosystem evaluation methods created in the United States. The species-habitat approach used in HEP is basically the same approach as the ecosystem assessment method proposed in ‘EIA Techniques in Biodiversity Conservation II – Process of Ecosystem Assessment’ (Environment Agency, 1999), which is considered the technical manual of ecosystem assessment in Japan. The principles of HEP and the individual cases are very relevant for promoting ecosystem assessment process in Japan.

A Future Agenda for Ecological Assessment

There are a multitude of things we need to do to improve our ecosystem management and control of development projects, including EIA systems. Here I would like to discuss these from the point of view of both the project proponent and of environmental policy and administration.

For the project proponent, it is desirable that loss (i.e. impacts) and gain (i.e. mitigation) be described in at least one-to-one ratio in EISs. Both impacts and mitigation should be quantitative. Details of analyses on the sequencing of 'avoidance-minimization-compensation' must be clearly described in the EISs to make sure the reasons why the proposed compensatory mitigation is necessary. It is also essential to make an explicit distinction in the EISs between compensatory mitigation projects that correlate directly with adverse impacts and other voluntary restoration/creation activities.

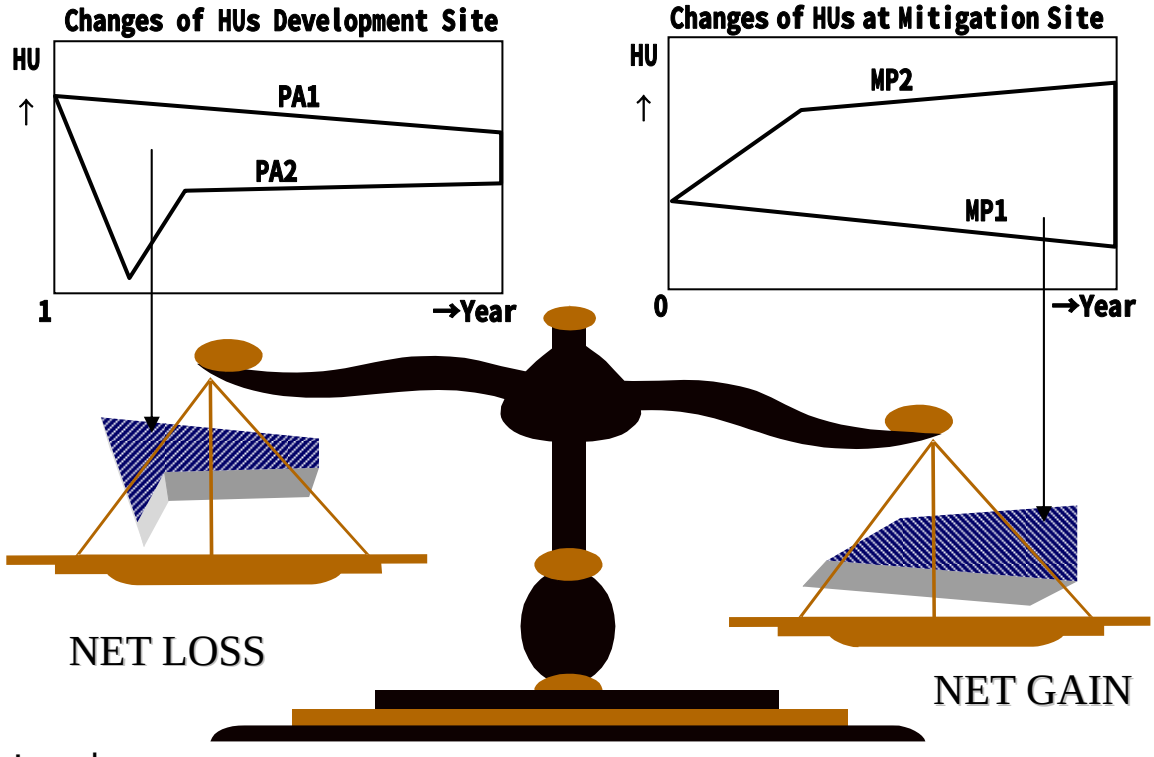

Figure 2. Conceptual diagram of HEP

For policies/administration sides, guidelines that describe the principles of ecological mitigation proposals such as the sequencing of 'avoidance-minimization-compensation' must be prepared to avoid 'excuse' type compensation. Technical manuals that include quantitative ecosystem evaluation methods such as HEP must be promoted to introduce and publicize the various existing quantitative techniques into Japan. Both national and local governments must prepare quantitative goals for ecosystem management, such as 'no net loss' policies, to promote substantial ecological restoration and creation projects. Primary zoning for ecosystem preservation must be introduced to reduce primitive conflicts between proposed development and conservation in the area that should be preserved. Ecological restoration and creation technologies and related industries must be supported to reduce the costs of compensatory mitigation and to improve capacity buildings in this field. Relationship between land-use planning and environmental impact assessment must be strengthened to ease the siting of compensatory mitigation. Finally introducing win-win systems such as mitigation banking must be considered to reduce the burden of compensatory mitigation on project proponents.

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