

# Producing and Trading Habitat

Or

## Land development as a source of funding for biodiversity conservation

### A review of mitigation and conservation banking in the USA and its implications for global biodiversity conservation<sup>1</sup>

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#### 1. Introduction

It is well known that biodiversity loss results mainly from habitat conversion and disturbance. Whether we like it or not, further conversion and disturbance of natural habitat is inevitable, due to on-going population growth and economic development. While habitat loss cannot be avoided entirely, the effects on biodiversity may be mitigated through efforts to protect, restore and enhance natural ecosystems.

In the USA, public agencies and private firms are legally required to avoid, minimize or mitigate adverse impacts on certain types of habitat. This requirement is imposed as a pre-condition for the issuance of permits authorizing land “development.” The obligation to protect habitat is mandated at a federal level by the 1972 Clean Water Act, which includes provisions to protect wetlands and aquatic resources, and the 1973 Endangered Species Act, as well as by relevant state and local laws.<sup>2</sup> A key provision of these laws is the possibility of compensation for environmental damages when adverse impacts are considered unavoidable, including the possibility of *off-site mitigation by third parties* where public authorities determine that it is feasible and appropriate.

The aim of mitigation and conservation banking is to provide a legal and financial basis for off-site compensation of the adverse impacts of development on natural habitat. The rationale for off-site compensation is, firstly, to improve the quality of conservation and, at the same time, to reduce the costs (including opportunity costs) of conserving habitat. Experience to-date suggests that mitigation and conservation banking can generate significant funds from land developers for public and private protected areas. Some aspects of mitigation and conservation banking in the USA may also be relevant for global biodiversity conservation efforts.

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<sup>1</sup> This report is based on material presented and discussions held at the 6<sup>th</sup> National Conference on Mitigation and Conservation Banking, held in San Diego, California, 23-25 April 2003. The views expressed here are those of the author alone and do not represent the position of IUCN or any other organizations mentioned.

<sup>2</sup> Passage of the Clean Water Act in 1972 gave the U.S. Army Corps of Engineers authority over dredging and filling in the “waters of the United States,” including many wetlands.

## 2. Foundations of mitigation and conservation banking in the USA

Environmental policy in the United States favors avoidance of adverse impacts on natural ecosystems, but rarely precludes development activities altogether. Even when negative impacts cannot be avoided, public authorities may perceive an over-riding interest in approving a project. In such cases, environmental agencies seek to minimize impacts and, in addition, to replace or restore the environmental benefits that may be lost.

In the case of damage to wetland resources, regulators may require the developer to mitigate the damages they cause. This can entail substantial costs for earthworks to lower or stabilize stream banks, restore stream length and “sinuosity”, replant natural vegetation, remove invasive species and other actions intended to re-create or rehabilitate damaged ecosystems. In most cases, public authorities require that wetland mitigation is undertaken on or adjacent to the development site itself, and that the original wetland benefits are re-created to the extent possible. This is called “on-site” and “in-kind” mitigation and is currently the preferred action where adverse impacts on wetlands cannot be avoided.<sup>3</sup>

### The rationale for off-site mitigation

Public environmental agencies may determine that the public interest would be better served if mitigation was carried out at some other location than the impact site (i.e. off-site), or if equivalent effort was invested in actions benefiting other ecosystems (out-of-kind mitigation). For example, where impacts on wetlands are numerous and small, as in the case of a highway construction or other “linear” project, it may be environmentally preferable to consolidate mitigation into a single site.

In such cases, the law allows a developer to transfer their liability for adverse impacts to a third party, who in turn assumes legal responsibility for providing compensatory mitigation for the original development (Figure 1). Wetlands mitigation banking is thus defined under US federal guidelines as:

‘the restoration, creation, enhancement and, in exceptional circumstances, preservation of wetlands and/or other aquatic resources expressly for the purpose of providing compensatory mitigation in advance of authorized impacts to similar resources.’ (*Federal Guidance for the Establishment, Use and Operation of Mitigation Banks*. 60 Fed. Reg. 228, 58605-58614. 1995)

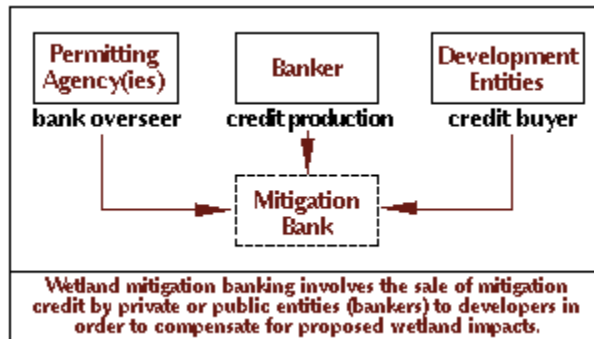
Various advantages are claimed for mitigation banking. The above guidelines refer to the environmental benefits of consolidating mitigation into larger areas of wetland. They also assert that bankers can often provide higher quality mitigation at lower cost, due to economies of scale and specialization. Regulatory agencies likewise find it easier to oversee a few large mitigation banks than several separate mitigation projects.

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<sup>3</sup> A recent study of compensatory mitigation by the National Research Council (2001) argued that “on-site compensation is typically constrained by hydrological conditions that are likely to have been or are being modified by the developments requiring mitigation.” Hence the report suggests that “opportunities for in-kind compensation need to be sought within a larger landscape context,” using a watershed approach.

Another benefit claimed for mitigation banking is the avoidance of a temporal loss in wetland benefits, because compensation normally takes place in advance of impacts. Hence the use of the term “banking,” which refers to the idea that compensatory mitigation is carried out, and credit for doing so is recognized (“banked”) by the regulatory agency, prior to any payments for mitigation services by developers.

**Figure 1. A schematic view of mitigation banking**



Source: Jentes (1998).

### Conservation banking and in-lieu-fees

Conservation banking refers to a similar arrangement in which the adverse impacts of land development on a range of ecosystems (in addition to wetlands) and species are compensated off-site. As in the case of wetland mitigation banking, for each hectare of habitat that is destroyed, developers must purchase credits from approved conservation bankers to support species conservation efforts in the surrounding area, for habitat that is similar to that which they intend to convert. Conservation banking is intended to address the perceived weaknesses of conventional mitigation:

“Mandated mitigation measures often . . . are undertaken at the same site as the development or project being mitigated for, result in piecemeal patches of conservation, require complex in-kind compensation (such as replacing wetlands with similar wetlands elsewhere), and/or do not address the broader conservation objectives of the project’s region.” ([http://www.dfg.ca.gov/hcpb/conplan/mitbank/banking\\_report.shtml](http://www.dfg.ca.gov/hcpb/conplan/mitbank/banking_report.shtml), accessed 9 May 2003)

An important distinction between wetland mitigation and conservation banking is the extent to which loss of natural habitat is tolerated. The Clean Water Act seeks to ensure that “no net loss” of wetlands occurs as a result of development. This means that for every hectare of wetland that is destroyed, one hectare or more of comparable wetland must be restored or re-created, often at significant cost.<sup>4</sup> In the case of conservation banking, on the other hand, the principle of “no net loss” does not always apply and credits for mitigation may be sold by existing protected areas without the need for major investment in habitat creation, expansion or improvement.

<sup>4</sup> In fact, a recent study concluded that the goal of “no net loss” was not being met, although the rate of wetland loss has apparently slowed (NRC 2001).

Another variant of mitigation or conservation banking is the payment of “in-lieu-fees” by developers to environmental agencies. As before, the developer is allowed to transfer legal liability for adverse impacts to another party, who in turn assumes the responsibility to compensate for those impacts. In-lieu-fees are normally paid to a public agency to fund land acquisition and/or other conservation activities.

Mitigation and conservation bankers, and the recipients of in-lieu-fees, are effectively land “un-developers.” They cover the costs of restoring and/or managing ecosystem function by selling offsets (credits) to land developers, i.e. people seeking permission to “dredge and fill” wetlands or to disturb the habitat of endangered species. Note that mitigation banks can only sell credits that meet agreed performance criteria according to a fixed timetable (e.g. 25% up front and the remainder over a 5 year period).

#### Ensuring the sustainability of mitigation and conservation banks

Under current law, mitigation credits (i.e. hectares of habitat) can only be used once, and habitat used for mitigation purposes must be conserved in perpetuity, even if the land is subsequently transferred to another owner. Typically, once the specified improvements in habitat quality are achieved and all approved credits are sold, bankers will turn over the property to a land steward agency, which may be public or private. A portion of the proceeds from credit sales is often used to create an endowment fund to cover long-term management costs. In most cases, there will also be certain restrictions placed on the land title deed to prevent future development, and thus to ensure that the habitat will be preserved and managed in perpetuity. The pre-requisites of mitigation and conservation banking are summarized in Box 1.

#### **Box 1. Pre-requisites of mitigation and conservation banking**

1. Land developers (public and private) are obliged or volunteer to mitigate the impacts of their activities on natural habitat.
2. Environmental regulators accept the principle of transferring full liability for mitigation and of off-site mitigation, where avoidance of impacts is not possible and on-site mitigation is deemed inferior.
3. Future land use change in a given area is sufficient to generate demand for mitigation services from land developers.
4. Mitigation service providers (banks) are able to provide eligible offsets (habitat restored or improved in perpetuity, to the satisfaction of regulators) at reasonable cost.

### **3. Evolution of mitigation and conservation banking in the USA**

Wetland mitigation banking grew out of early experiments with off-site mitigation in the late 1970s. Many years were spent perfecting the concept, developing guidelines and securing agreement among relevant public agencies (Table 1). In the past 10 years, however, mitigation banking has become a significant business in the United States.

**Table 1. Key milestones in the development of mitigation banking in the USA**

1976-81	US Dept. of Fish and Wildlife explored potential of off-site mitigation
1981	Federal guidelines for mitigation banking are issued
1988	12 mitigation banks recognized at National Wetland Policy Forum
1990	Memorandum of Agreement on mitigation between US Environmental Protection Agency and US Army Corps of Engineers
1995	“Federal Guidance for the Establishment, Use and Operation of Mitigation Banks” issued
1998	Emergence of In-Lieu-Fee programs
2001	National Research Council review of mitigation banks
2002	Environmental Law Institute report on mitigation banks and in-lieu-fees

Between 1993 and 2000, approximately 24,000 acres of wetlands were permitted by the US Army Corps of Engineers to be filled (i.e. lost), and 42,000 acres were required as compensatory mitigation on an annual basis (NRC 2001). As of 2001, there were more than 200 mitigation banks in 40 out of 50 states, covering roughly 140,000 acres (approximately 57,000 hectares) in over 400 separate sites (Table 2). More than half of all mitigation banks are private operations run on a commercial basis, providing compensatory mitigation services to both public and private clients.

**Table 2. Growth of mitigation banking in the USA**

	1992/93	2001/02
Approved banks	46	219
Wetlands restored	17,664 acres	139,896 acres
Participating states	18	40
Size of banks (% > 100 acres)	35%	57%
Private commercial banks	1	135

Source: ELI (2002).

Conservation banking is less well-established nationally, but is already significant in California and some other states, and is likely to become more widespread as federal regulatory guidance becomes available in late 2003. Other initiatives to create market-based incentives for nature conservation include the new policy on water quality trading issued by the US Environmental Protection Agency in early 2003, and new or enhanced incentives to encourage conservation-oriented farming, under the 2002 Farm Bill.

#### Defining ecological equivalence for off-site mitigation

Public agencies in the USA have developed methods to distinguish different types of habitat and to assess habitat quality, so that mitigation effectively conserves threatened resources or species. As noted previously, in the case of off-site mitigation, developers must purchase credits for habitat similar to that which they intend to convert. Normally this means that they can only purchase mitigation or conservation credits within a defined “service area” which includes comparable habitat. In practice, mitigation service areas for wetlands correspond to watersheds or other natural hydrologic units for about two-thirds of all banks, nationwide (ELI 2002). In

other cases, the service area may be defined to match the administrative or political boundaries of a county or state, with no explicit consideration of ecological criteria.

For certain types of habitat, land developers may be required to purchase more than one hectare of credit for every hectare of habitat converted. Ratios of two-to-one or three-to-one are not uncommon. This may reflect a simple “margin of safety”, or a judgment by the regulatory agency that the habitat lost is of higher quality than the habitat used for mitigation purposes. However, there appears to be little consistency in the approaches used by different agencies to assess the functional equivalence of habitat. For example, in the case of wetland mitigation the aim of “no net loss” has been interpreted by federal agencies as no loss in acreage *or in ecological function*. Nevertheless many state and local authorities rely solely on acreage indicators when allocating debits and credits, i.e. the surface area under specific vegetation cover and density. Less than half of all wetland mitigation banks in the US are allocated credits on the basis of functional equivalence, e.g. slowing flood waters, removing agro-chemical nutrients or maintaining species diversity (ELI 2002; Tucker 2003). Systematic efforts to assess the *social value* of wetlands lost or restored, in terms of recreational visitor numbers, willingness-to-pay or other economic indicators, are even less common.

#### Economic costs and benefits

Prices of off-site mitigation credits vary according to the costs of mitigation and the scarcity of habitat relative to demand from land developers. Thus wetland mitigation credits, which involve significant investment to restore viable habitat under the principle of “no net loss”, may cost as much as US\$100,000 per hectare. On the other hand, credits for coastal sage scrub in southern California cost around US\$10-15,000 per hectare, reflecting the lower costs of managing existing habitat. For private land developers these are significant sums, but often far less than the market value of converted land or the costs of on-site mitigation. Hence many developers prefer to pay a mitigation banker to assume their liability for conserving habitat, rather than attempting to avoid or mitigate habitat loss on-site.

#### Equity aspects of mitigation banks

Any effective mitigation policy may be considered “just” to the extent that it conforms to the Polluter Pays Principle. In other words, those who would impose an environmental cost on society (i.e. developers who seek to destroy habitat) are obliged to pay that cost in the form of mitigation. Third party mitigation has the additional advantage of rewarding and encouraging those who seek to provide environmental benefits to society (i.e. mitigation and conservation bankers). In this respect mitigation banking is more equitable than conventional processes of land use change, which rarely oblige land users to pay for the environmental damages they cause, and even less frequently reward land users who provide environmental benefits.

Whether mitigation banking also helps to reduce poverty is less clear. The answer depends on the extent to which poor people are harmed by land development and helped by mitigation (or vice versa). Net impacts on the poor are likely to be site-specific. For example, we may suppose that private land developers will tend to orient their efforts to consumers who have relatively more purchasing power, e.g. by building homes for sale or shopping areas that cater to the better-off. Some poor people may gain employment from the resulting development, but they may also lose access to natural resources damaged by the change in land use. Others may be pushed out of the

area altogether by rising housing costs due to increased land prices. Such adverse impacts on the poor should be less likely in the case of publicly-funded development projects, which are often specifically intended to improve access by poorer groups to services and/or market opportunities. Nevertheless, as in the case of private development projects, there may be a corresponding loss of environmental benefits.

The impacts of land development on the poor are thus likely to be mixed. Similarly, mitigation and conservation projects may have positive or negative impacts on the poor. On the one hand, such projects may provide employment and/or improved access to environmental amenities. On the other hand, some mitigation projects may involve restrictions on land use that affect the poor adversely, e.g. grazing bans and other forms of exclusion. Note that mitigation banks are often located in areas where land prices are low (in order to ensure competitive pricing of mitigation services), which is also where poor people are more likely to live. We might therefore expect the poor to gain *or lose* disproportionately from the creation of mitigation and conservation banks. This underscores the importance of ensuring that the interests and opinions of poorer groups are reflected in the creation and operation of mitigation banks.<sup>5</sup>

#### The role of government in mitigation banking

The adoption of market-based approaches to environmental management, such as mitigation and conservation banking, does not imply a reduced role for government. On the contrary, public agencies act as the ultimate guarantor of the quality, sustainability and efficiency of market-based environmental management. Among other things, governments must define clear environmental targets and performance indicators, establish an enabling framework of incentives and/or property rights to stimulate demand for and supply of environmental services, and ensure fair and transparent monitoring and enforcement of the rules.

In practice, weak government capacity is often a significant barrier to the implementation of market-based instruments. In the USA, the main bottlenecks and complaints about mitigation banking can often be traced to gaps in the regulatory regime, including inconsistent rules and treatment, and weak capacity on the part of regulators.

#### **4. Towards an international framework for mitigation and conservation banking**

The USA is not the only country that requires land users to avoid, minimize or mitigate adverse environmental impacts. Some other countries likewise offer land developers the opportunity to compensate for adverse impacts (including habitat loss) by investing in conservation on- or off-site. In addition, some major multinational companies undertake mitigation and compensation initiatives on a purely voluntary basis. At an international level, however, there are no generally agreed standards or procedures for compensatory mitigation. Moreover, in many developing countries, where biodiversity is at greatest risk, there is little or no effective requirement to mitigate the adverse impacts of land use change, either on- or off-site.

In the absence of a consistent and transparent framework for compensatory mitigation, we can expect only patchy or token efforts by a minority of companies and agencies. The resulting

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<sup>5</sup> The impacts of mitigation banking on the poor did not appear to be an issue of concern in any of the presentations or discussions at the 6<sup>th</sup> National Conference on Mitigation and Conservation Banking.

support for conservation may be impressive, in some cases, but it is unlikely to reflect the true scale of impacts, and may bear little relation to conservation priorities.

International agreement on how to define biodiversity targets, acceptable forms of mitigation and associated financial mechanisms is probably years away. The barrier is not conceptual. It is easy to envisage a “green development mechanism” for trade in biodiversity conservation obligations, along the lines of the Clean Development Mechanism for climate change mitigation under the Kyoto Protocol (see for example Cervigni 1993; Chomitz 1999; Graßl et al. 2002; Panayotou 1994). A larger obstacle to a legally-binding agreement is the present lack of enthusiasm among the world’s governments to embrace new environmental commitments, as demonstrated by the modest promises made at the World Summit on Sustainable Development in 2002. One need not wait for an inter-governmental convention, however, in order to improve the consistency and transparency of impact assessment methods, or to raise the standard of compensation. The key is to initiate voluntary but *collective* action, starting in those countries (or with those organizations) which accept the principle of compensatory mitigation.

One option is to promote a voluntary agreement among development assistance agencies to adopt a certain standard of impact assessment and mitigation in their projects. This could include principles and procedures for compensatory mitigation off-site. A similar approach could be used with leading companies working in particular land-using sectors, e.g. oil and gas, road construction, mining, etc. The lessons from such a voluntary scheme would be invaluable for any future negotiation of a multilateral agreement.

A voluntary agreement for compensatory mitigation, whether national or international in scope, would need to address the following key requirements:

1. Establish targets for biodiversity mitigation (e.g. “no net loss” of area or functionality);
2. Define consistent and transparent indicators for measuring debits and credits (ideally in terms of Total Economic Value but at a minimum in terms of ecological functionality);
3. Assign responsibility for assessing development impacts (determining liability) and for approving offsets (possible role for existing certification agencies);
4. Ensure sustainability of mitigation after credits have been sold (e.g. though endowment funds for on-going management, mandatory renewal of credits subject to inspection, easements and other legal restrictions on land use);
5. Identify potential buyers of mitigation services (e.g. development assistance agencies, willing governments, progressive companies); and, once their commitment is secured;
6. Mobilize suppliers of mitigation services (e.g. conservation NGOs, national environmental agencies, public and private protected areas).

## **5. Conclusion**

Experience in the USA suggests that compensatory mitigation of development impacts can generate significant financial resources for conservation, while limiting biodiversity losses. On an international scale, and in the developing world, some off-site compensation and mitigation does occur, but there is little consistency or transparency in the procedures followed or the standard of mitigation achieved.

An inter-governmental agreement to establish a framework for legally-binding compensatory mitigation is a long way off, if it ever happens. In the mean time, it may be possible to develop a voluntary scheme for conservation banking supported by development agencies, multinational companies and/or far-sighted governments. Such a scheme should aim to improve consistency and transparency in how the impacts of development activities are assessed, and in the standard of mitigation (including off-site compensation) that is expected. IUCN and other environmental organizations can play an important role in developing and implementing such a scheme, which could generate significant new resources for nature conservation.

## 6. References

Anon. 1995. *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks*. 60 Federal Register 228, 58605-58614. Washington, D.C.

Cervigni, R. 1993. *Biodiversity: Incentives to Deforest and Tradable Development Rights*. CSERGE Working Paper GEC 93-07. University College London: London.

Chomitz, K.M. 1999. *Transferable Development Rights and Forest Protection: An exploratory analysis*. Paper prepared for Workshop on Market-Based Instruments for Environmental Protection, July 18-20, 1999, John F. Kennedy School of Government, Harvard University: Cambridge.

ELI. 2002. *Banks and Fees: The status of off-site wetland mitigation in the United States*. Environmental Law Institute: Washington, D.C.

Graßl, H., Kokott, J., Kulesa, M., Luther, J., Nuscheler, F., Sauerborn, R., Schellnhuber, H.-J., Schubert, R., Schulze, E.-D. 2002. *Charging the Use of Global Commons*. Special Report, German Advisory Council on Global Change: Berlin.

Jentes, J.E. 1998. "Wetland Mitigation Banking: An Innovative Approach for Wetland Management in the Great Lakes Region" *Ohio Sea Grant Communications Twine Line*. September/October 1998, pages 1 & 4

NRC. 2001. *Compensating for Wetland Losses under the Clean Water Act*. Committee on Mitigating Wetland Losses, Board on Environmental Studies and Toxicology, Water Science and Technology Board, Division on Earth and Life Studies, National Research Council. National Academy Press: Washington, D.C.

Panayotou. T. 1994. 'Conservation of Biodiversity and Economic Development: The Concept of Transferable Development Rights' *Environmental and Resource Economics*, 4:91-110.

Tucker, M. 2003. 'Evaluating the Ecological Success of Wetland Mitigation Banks Using HGM: An Example from San Diego County', presentation to the *6th National Mitigation and Conservation Banking Conference*, April 23-25, 2003, San Diego, California.

Additional information on mitigation and conservation banking:

<http://www.mitigationbankingconference.com>

<http://www.dfg.ca.gov/hcpb/conplan/mitbank/mitbank.shtml>

<http://ceres.ca.gov/topic/conservation.html>

<http://www.iwr.usace.army.mil/iwr/regulatory/regulintro.htm>

<http://endangered.fws.gov/permits/permits.pdf>

<http://www2.eli.org/pdfs/d12-08ExecSumm.pdf>

<http://www2.eli.org/wmb/index.html>

<http://www2.eli.org/wmb/links.htm>

<http://www.epa.gov/owow/wetlands/facts/fact16.html>

<http://www.nap.edu/books/0309074320/html/>