

Novel biodiversity offset strategies: Satoyama Banking and Earth Banking

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Biodiversity conservation is achieved only by conserving a diversity of habitats that will support a diversity of species. Development projects are some of the major causes of habitat loss. We conducted a literature search to review legal frameworks and practices on biodiversity offsets or banking strategies as a means of compensating for habitat loss caused by development projects in various countries. After analyzing problems associated with current practices of biodiversity offset and banking strategies, two new strategies were proposed: 1) Satoyama Banking, to enable coexistence with nature in secondary ecosystems; and 2) Earth Banking, to deal with broad impacts and mitigation measures for ecosystems.

Our investigation showed that there were 50 countries that had mandatory offset programs based on a “no net loss/net gain” policy (Table 1); these programs were mostly based on systems in use in the U.S.A. Legislation for offset/banking strategies, and assessment methods of countries that already had biodiversity banking strategies in effect, were selected from the literature and reviewed (Table 2).

Four general methods of offsetting were identified for project proponents for which we propose novel terminology. “Direct-primary offset” is the execution of habitat restoration, creation or enhancement projects by the project proponent. This type includes, so called, “traditional” compensatory mitigation in the U.S.A. “Indirect-primary offset” is the use of fees, paid by project proponents, for restoration, creation or enhancement of habitats. This type includes mitigation banking and “in-lieu fee” programs in the U.S.A. “Direct-secondary offset” is a variety of activities that help support restoration, creation or enhancement projects by the project proponent. This type includes education and research that support restoration, creation or enhancement of habitats in Australia. “Indirect-primary offset” is the use of fees, paid by project proponents, for restoration, creation or enhancement of habitats. “Indirect-secondary offset” is the use of fees, paid by project proponents, for implementing project that help habitat restoration, creation or enhancement. “Direct-“ refers to action directed by the project proponent, whereas “indirect-“ reflects action by other parties. “Primary-“ means habitat restoration, creation or enhancement projects, whereas “secondary-“ refers to actions that help support these projects.

Consequently, direct-primary offset tends to be more both out-of-kind in quality and off-site in spatial alignments. Accumulation of development projects in one region causes a subsequent decrease in land available for offsetting. Therefore, the more habitats that are threatened, the more difficult it is for effective offset programs to be implemented.

Indirect offset strategies, including biodiversity banking and in-lieu-fee programs, tend to be more effective relative to direct offset strategies. Project proponents of indirect offset strategies tend to avoid restoration, creation or enhancement projects with high risk and will favor relatively higher user fees with less risk.

Secondary offset strategies also tend to be more popular than primary offset programs. In Queensland, Australia, secondary offset strategies include providing infrastructure that will help protect the environmental values being impacted, and funding for targeted research linked directly to the environmental values.

Habitat conservation activities for biodiversity consist of spatial allocation of habitat in land use and maintenance for quality improvement of the site. It is very important to recognize that there cannot be any maintenance if there is no habitat preserved. Land acquisition for habitats or ecosystems must take priority over secondary offset activities to achieve sustainability for the region.

However, once an offset site is provided and activities of restoration, creation or enhancement are completed, maintenance is crucial to the success of offset strategies. Most failures of direct-primary offset programs are because there was no maintenance strategies initiated, not because the maintenance strategies were ineffective.

Many natural habitats are maintained by indigenous peoples' traditional care. Japanese traditional "Satoyama" landscapes are secondary ecosystems that have been created and maintained by interactions between wildlife and humans. There are many Satoyama-like secondary ecosystems and Satoyama-like traditional wisdom about how to manage secondary ecosystems ecologically and sustainability in the world. Therefore, Satoyama knowledge of maintenance can be integrated with principles of biodiversity banks. Such a "Satoyama Banking" strategy would bring great potential for achieving ecologically-sound sustainable rural areas(Figure 1).

As mentioned previously, "direct-primary" offset tends to be more "out-of-kind" in quality and more "off-site" in spatial alignment. Transboundary offset will be unavoidable because the national border is an artificial boundary. The Biodiversity Trading System (BTS) in Europe reflects these concerns. Consequently, "Earth Banking," i.e. transboundary biodiversity offset between ecologically rich countries and economically rich countries, may have potential. If the potential is getting larger, studies on "Earth Banking" must be started immediately to avoid becoming a mere label in biodiversity conservation with immoderate money-market speculation (Figure 2).

Table 1 Countries that have legislation and guidelines for biodiversity offset

Number	Country	Legislation and Guideline of Biodiversity Offsets	Year
1	U.S.A	Fish and Wildlife Coordination Act, as amended	1958
		Endangers Spices Act	1973
		Clean Water Act, as amended	1972
2	Netherlands	Dutch Forest Law	1961
		Environmental Management Act	1987
3	Brazil	Forest Code	1965
4	Israel	Planning and Building Law	1973
5	Columbia	Natural resources Act	1974
6	Thailand	National Environmental Act	1975
7	France	Natural protection Ac	1976
8	Germany	Federal Nature Conservation Act	1976
9	Philippines	Presidential Decree No.1150	1977
10	Switzerland	Federal Law for Protection of Nature and Landscape	1983
11	Canada	Fish Act under R.S.1985,c.F-14 Policy for Management of Fish Habitat	1986
		Habitat Conservation and Protection guidelines 2nded	1998
12	Mexico	General Act on Ecological Equilibrium and Environmental Protection	1988
		Program for Environmental Restoration and Compensation	2003
13	New Zealand	Resource Management Act	1991
14	EU countries	Habitat Directive	1992
		Environmental Liability Directive	2004
15	Nepal	National Environmental Impact Assessment Guidelines	1992
16	Austria	Environmental Impact Assessment Act	1993
17	South Korea	Environmental Impact Assessment Act	1998
18	Egypt	Environmental Protection Law	1994
19	Lithuania	Biodiversity Conservation –Strategy and Action Plan	1995
20	Pakistan	Environmental Protection Act of 1997	1997
21	Panama	National Strategy for Payments for Environmental Services	1997
22	Costa Rica	Biodiversity Law	1998
23	South Africa	National Environmental Management Act	1998
		National Biodiversity Strategy Action Plan	2005
		Guideline for involving biodiversity specialist in EIA processes	2005
24	Australia	Use of Environmental Offset Under the Environmental Protection and Biodiversity Conservation Act 1999	1999
		Native Vegetation Management Framework –A Framework for Action	2002
		The Threatened Species Conservation Amendment(Biodiversity Banking)Act 2006	2006
25	Japan	Environmental Impact Assessment Law (Compensation is not mandatory.)	1999
26	Madagascar	Mining Code	1999
		Madagascar Action Plan	2006
27	Argentina	Environmental Framework Law	2002
28	China	Environmental Impact Assessment Law	2003
29	India	Biodiversity Rule	2004
30	Belgium	Belgium’s National Biodiversity Strategy 2006-2016	2006

Table 2 Biodiversity Offset: Comparison between U.S.A., Germany and Australia

	U.S.A.	Germany	Australia	
Targets of Biodiversity Offsets	Ecosystems, habitats	Natural assets in reference to habitats, soil, water, climate, air quality and the aesthetic quality of the landscape (Wende et al, 2005)	Native vegetation	
Goal of Biodiversity Offsets	“no net loss” -> “net gain”	“no net loss”	“no net loss”, “net gain”, “maintain and improvement”	
Various actions for Biodiversity Offsets	· Ecological restoration / creation / enhancement · Wetland mitigation banking · Conservation banking	· Compensation measures · Substitution measures · Compensation pool, Eco-Account	· Direct biodiversity offsets · Bush Broker (VIC) · BioBanking (NSW)	
	In-lieu-fee Arrangement	Compensation payment	Indirect biodiversity offsets	
How to assess the “Goal”?	· Acreage · HEP (Habitat Evaluation Procedure) · WET (Wetland Evaluation Technique)	· Describing method · Biotope value procedure (Numeric methods) · Cost-of-restoration approach (Monetary methods)	· BioBanking Assessment Methodology (The State of New South Wales) · Habitat Hectares (The State of Victoria)	
Legislation & Guideline	Biodiversity Offsets	<p>“Fish and Wildlife Coordination Act, as amended” (1958) This act requires describing the damage to wildlife attributable to the project and the measures proposed for mitigating or compensating for this damage.</p> <p>“National Environmental Policy Act” (1970) This act determines that purpose of EIA is to prevent or eliminate damage to the environment and biosphere.</p> <p>“Clean Water Act, as amended” (1972) This act determines that proposed activities are regulated through a permit review process include avoiding wetlands impacts, minimizing potential impacts on wetlands and compensating any remaining unavoidable impacts.</p> <p>“Endangers Species Act” (1973) This act determines that the applicant needs to develop a Habitat Conservation Plan, designed to offset any harmful effects the proposed activity might have on the species.</p> <p>“Mitigation Policy” (1981) The Mitigation Policy identifies four Resource Categories, defines designation criteria, and establishes a mitigation goal for each. The mitigation goal for habitat in Resource Category 1 is “no loss of existing habitat value.” The mitigation goal for habitat in Resource Category 2 is “no net loss of in-kind habitat value.” The mitigation goal for habitat in Resource Category 3 is “no net loss of habitat value while minimizing loss of in-kind habitat value.” The mitigation goal for habitat in Resource Category 4 is “minimize loss of habitat value.”</p> <p>“Memorandum of Agreement” (1990) The types of mitigation enumerated by CEQ are compatible with the requirements of the guidelines; however, as a practical matter, they can be combined to form three general types: avoidance, minimization and compensatory mitigation.</p>	<p>“Federal Nature Conservation Act” (1976) Impact Mitigation Regulation was adopted in Germany in 1976 as part of the Federal Nature Conservation Act (Peters, 1996). At a minimum, the existing ecological situation is to be preserved (“no net loss” (koepfel et al, 1998)). Impact Mitigation Regulation follow a three step mitigation hierarchy: avoidance, minimization, and compensation. Financial compensation may take place only as a last step after the decision-making process (Wende et al, 2005).</p>	<p>“Use of Environmental Offsets Under the Environmental Protection and Biodiversity Conservation Act 1999” (1999) Offsets are generally applied in Australia on the basis that all options to avoid and mitigate on-site impacts have been applied prior to the consideration of off-site actions.</p>
	Biodiversity Banking	<p>“Federal guidance for the establishment, use and operation of Mitigation Banking” (1995) This policy provide policy guidance for the establishment, use and operation of mitigation banks for the purpose of providing compensatory mitigation for authorized adverse impacts to wetlands and other aquatic resources.</p> <p>“Guidance for the Establishment, Use, and Operation of Conservation Banks” (2003) This policy provide policy guidance on the established, use, and operation of conservation banks for the purpose of providing a tool for mitigating adverse impacts to species listed as threatened or endangered under the Endangered Species Act of 1973, as amended.</p>	<p>“Federal Building Code, as amended” (1998) “Federal Nature Conservation Act, as amended” (2002) These two laws were amended to optimize enforcement and implementation of compensation measures. As a result, establishment of compensation pools and Eco-Account (mitigation bank) were increased.</p>	<p>NSW “The Threatened Species Conservation Amendment(Biodiversity Banking)Act 2006” (2006) There is it for the purpose of achieving a no net loss for the biological diversity or a net gain through biological diversity banking.</p> <p>VIC “Native Vegetation Management Framework -A Framework for Action” (2002) For all development to affect for natural vegetation, this guideline offers coherent approach by the “quantification” “matching” “security” of the biological diversity offset to the net gain first aim.</p>

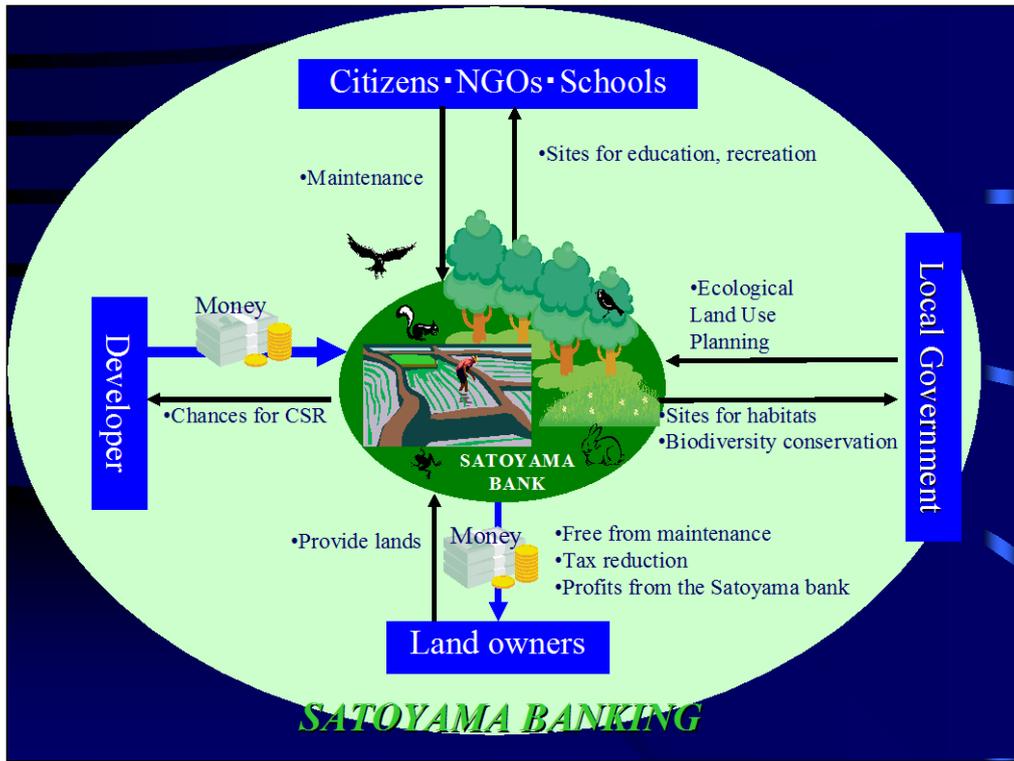


Figure 1 Conceptual image of “Satoyama Banking”

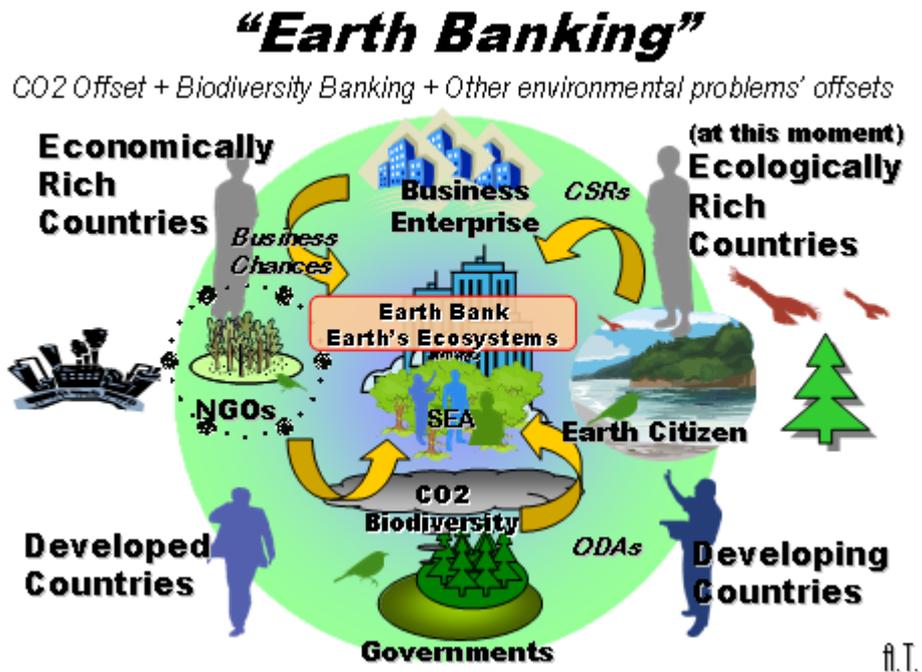


Figure 2 Conceptual image of “Earth Banking”

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