The eco-account: a reasonable and functional means to compensate ecological impacts in Germany

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Abstract

Eco-accounts are used in Germany to simplify and particularly optimize the planning and realization of mitigation and compensatory measures within the environmental impact assessment (EIA) and other impact coverage systems. Since 1998, eco-accounts are installed in many municipalities and government administrations. In general, an eco-account should be developed out of a landscape plan which covers the whole surface of a municipal district. The potentials of these landscapes within the districts for ecological improvement measures are evaluated. The appropriate and available lots are transferred to a pool (PAL). As soon as a measure on one of these lots is realized (see figure 1), it can be transferred onto the eco-account and be used as a compensatory measure for any impact.

Figure 1: The beautiful and ecologically very valuable fruit tree meadows under low-input management can be used as eco-account measures
Introduction

Building traffic lines, residential areas or industrial zones impact the landscape. The rainfall water cannot filtrate into the soil, asphalt or concrete cannot be a habitat for plants and animals and doesn´t cool down the air temperature any more.

Mitigation has a long tradition in Germany. Beginning in 1976, the Law of Nature Protection says that such impacts must be (if possible) avoided or (if avoiding is not possible) be mitigated and compensated with measures which (1) have the same ecological functions and (2) should be located in spatial context with the impact (see figure 2).

In reality, the compensation measures very often show a lack either of the spatial context or the functional coherence (KÜPFER et al. 1997). In 1998 the law was changed for many types of impacts: now it is possible to mitigate for impacts caused by municipal plannings such as residential areas.

This was the beginning of the eco-account. Municipalities now can realize ecological measures like afforestations with local tree species, renaturalize rivers and creeks, initiate wetlands or dry sheep pastures (see figures 1 and 3) – and they are allowed to shift the cost of the measures to the builder-owners: in addition to the regular land price the builder-owners pay for ecological compensation measures. Generally, these costs are around 1 to 5, sometimes up to 10 percent of the basic land price. This means a maintainable rise in the costs for the builder-owners, but a very high rise in the possibilities of compensating the effects of an impact and to maintain the ecological balance.

In the following there will be shown how an eco-account can be created and implemented into the planning process. Examples are given from the region of Baden-Württemberg and Bavaria (South Germany).

Figure 2: compensation measures in local context with the impact
The eco-account system is also discussed in other European countries. The Czechoslovakian institution DHV defines the eco-account scheme requires users and developers to invest in nature. In doing so, a positive ‘nature balance/credit’ is generated, which can subsequently be ‘spent’, if necessary by carrying out an equivalent ‘value’ of infrastructural or other projects. In most other respects it is similar to compensatory payment. Importantly, however, measures under the eco-account scheme in general require less land and resources than traditional compensatory measures. Eco-account funds can only support improvements in nature value, they cannot be used to achieve or maintain common land management standards. Examples of such measures are: returning sealed surfaces to a more natural state; restoration of green and brown field sites (including arable land), reforestation, restoration of rivers, provision of wintering habitats for animals (see www.dhv.cz/projekt.natura).

RUNDCRANTZ & SKÄRBÄCK (Swedish University for Agricultural Sciences, 2003) argue: “The use of different measures to compensate the environment when human development projects take place has been frequently discussed in both Europe and the USA. This paper reviews the use of environmental compensation in Germany, the USA, the Netherlands, the UK and Sweden. In Germany compensation methods have been used since the 1970s. In the USA there are requirements for mitigation and compensation measures for wetland losses. In the Netherlands, the compensation measures are focused on certain protected areas. In the UK there are few legal instruments that formally require environmental compensation. In Sweden the new environmental legislation has made it possible to legally demand environmental compensation measures to gain permits for exploitations. However, these new Swedish requirements have only been available since 1999 and the use of compensation measures needs to be developed. … the German environmental compensation practice is most developed and is worth further study in order to develop the use of environmental compensation methods in the Swedish planning system.

Chinese scientists have a similar approach to balance ecological values: in the Qinba mountains they assess ecosystem services related to the vegetation’s primary productivity, soil and fertility conservation, water conservation, carbon fixation and oxygen supply and relate it to economical values (Li et al. 2006). Nevertheless, the systems shown in this article are relating to ecological values.
How to create an eco-account: from the landscape plan to the PAL (pool of appropriate lots) and the eco-account

Step 1: Landscape Plan

As a rule, an eco-account is developed from a municipal landscape plan. The landscape plan defines

(1) areas of existing high ecological value (“areas of maintenance”): in the Region of Baden-Württemberg such areas are for example moors, wetlands and didicious forest, but also cultural landscapes like dry meadows or pastures and fruit tree meadows. The ecological values of these areas are to be maintained. They are very important but cannot be taken as measures to compensate impacts, because compensatory measures must improve the ecological situation (see (2)).

(2) areas of high potential for “high quality biotopes”: these are for example slopes, depressed areas, or dry, poor or wet soils. The ecological potential there doesn’t correspond to the real situation, for example because they are under intensive agricultural use. By definition measures in these areas cause ecological improvements and can be taken as compensatory measures.

Figure 4: Definition of PAL areas (pool of appropriate lots) out of the landscape plan of the municipality of Dettingen unter Teck, Baden-Württemberg (STADTLANDFLUS 2003): „Geplante Erhal tungsmaßnahmen“ (blue circle) means “area of maintenance; no possibility to take lots into the eco-account”; „Geplante Entwick lungsmaßnahmen“ (green circle with yellow surface within) means “area with a high potential for ecological improvements; measures could be realized on all available lots”; black rectangle with in the green circle: site of an available lot, see Figure 5)
Step 2: pool of appropriate lots (PAL)

When areas of high ecological potentials are defined, these areas have to be further investigated: the availability of the lots has to be cleared and the measures have to be planned in detail (Landesanstalt für Umweltschutz Baden-Württemberg 2005):

Most of the parcels of land (or lots) in the countryside are private properties. For example, out of 100 lots of high potential maybe 3 lots are municipal and another 7 are easily available from private landowners. These 10 lots are defined as PAL (pool of appropriate lots). Lots without availability cannot be taken into the PAL or even into the eco-account. The landscape planner argues with the municipal administrators and the landowners to find out the short term and medium term availabilities. If there are no appropriate lots in public property, the municipality buys such lots from private landowners to fill the PAL. It is important to have enough lots in the PAL to reduce price speculation. The more the landscape planner concentrates for example on lots with bad soil quality (which in general corresponds with high ecological potential), the lower is the risk of price speculation.

Figure 5: available lots in the PAL: lots 752, 748 and 716/2 are municipal properties and have a high potential for ecological measures (Landesanstalt für Umweltschutz Baden-Württemberg 2003)

Step 3: the eco-account

Maybe the municipality decided to realize measures on 4 out of the 10 available lots described above. After realisation (figure 6), the measures and lots can get transferred onto the eco-account. In Baden-Württemberg this is done with a system of “eco-points” which are given per lot, depending (a) on the difference between the biotope qualities before and after the measure realization and (b) the dimension of the lot in m² (Landesanstalt für Umweltschutz Baden-Württemberg 2005). An example is given below in figure 7. When realized, the municipality has to organize and finance the maintenance of this newly created biotope. The cost for maintenance can be shifted proportionally to the building owners.
Figure 6: the municipal administration has chosen lot 752 to realize measures (plantation of dedicious trees). After the plantation is done, the measure can be transferred onto the eco-account.

Figure 7: Example for the appropriation of an eco-account measure to an impact

a) impact: development of a new residential area on a meadow of a medium ecological value (1 ha, 60% asphalt/buildings, 40% house gardens)
Ecological value “before”: 130,000 units (13 eco-points x 10,000 m²)
Ecological value “after”: 30,000 units (1 eco-point for asphalt/buildings x 6,000 m², and 6 eco-points for the gardens x 4,000)
Eco-balance 1: -100,000 units

b) eco-account measure: change from intensive field use (4 eco-points) to extensively used dry sheep pasture (19 eco-points¹) on 8,000 m², giving 15 x 8,000 = 120,000 units.
Eco-balance 2: +120,000 units

Net, there is a plus of 20,000 units which remain on the eco-account after appropriation of the eco-account measure to the impact.

¹ eco-points for such pastures can be in a range from 11 to 27 eco-points, depending on site and biotope context (general range: from 1 for asphalt to 64 eco-points for very rare and highly specified biotopes like moores, natural lakes and rock formations)
With this system, a municipality can realize different development areas and compensate the resulting impacts very easily and foresighted. Figure 8 shows a statement of a municipal eco-account:

<table>
<thead>
<tr>
<th>date</th>
<th>Compensatory measures</th>
<th>Units</th>
<th>Impacts caused by developments</th>
<th>Units</th>
<th>Units net</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apr. 2007</td>
<td>Measure 1 (lot 752)</td>
<td>120.000</td>
<td></td>
<td></td>
<td>+120.000</td>
</tr>
<tr>
<td>Aug. 2007</td>
<td>Spatial plan “Letten”</td>
<td>-100.000</td>
<td>+ 20.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 2007</td>
<td>Measure 2 (lot 748)</td>
<td>85.000</td>
<td></td>
<td></td>
<td>+105.000</td>
</tr>
<tr>
<td>Jan. 2008</td>
<td>Spatial Plan “Mark”</td>
<td>- 73.000</td>
<td>+ 32.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oct. 2008 (preview)</td>
<td>Bypass road „Hart“</td>
<td>around - 64.000</td>
<td>Note: new measures needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For simplifying the booking of measurements (+) and impacts (-), most eco-accounts are based on a data bank, for example ACCESS. These data banks can be updated regularly and make the data transfer and control very easy. They also can be linked with a geographical information system (GIS) like ArcView or others to link with planning cartography.

Figure 9: a previous field under intensive use is prepared for a low-input sheep pasture (May 2006)
Figure 10: meanwhile the plants have covered the whole pasture and enrich the biodiversity in this area. The municipality now has a “well-filled eco-account” (August 2007)

List of literature used:
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