4 COMPENSATION SYSTEMS

This chapter refers to systems which aim to compensate for soil loss through sealing. The authors were able identify three different types of compensation:

- compensation payments,
- compensation measures and
- trading systems

It has to be noted that all three types refer to land take, meaning that the focus is on the conversion of biologically functional soils to building land. As explained previously, built-up land is generally only partly sealed. In the following sections the three systems are explained and practical implementations are explained.

4.1 Compensation payments

This method is based on the principle that soil consumption is charged with a fee. The payments are dependant on the quality of the consumed soil. This method is applied in several countries and regions with the intention to conserve the best agricultural land. The payments are usually related to soil fertility classes. In the following 3 applications are described.

4.1.1 Compensation payments for agricultural land in the Czech Republic

Until the early 1990ies the loss of agricultural land was constantly increasing in the Czech Republic and new developments were mostly realised on the best soils. Shortly after its independence the former Czechoslovakia\(^1\) enforced an Act on the Protection of Agricultural Resources. The system defines five classes of agricultural land of which the classes I and II are the most fertile and productive ones. The conversion of Class I and II soils requires a special permit and is connected to a fee directed to the State Environment Funds\(^2\). Based on a fee ranging from 8 to 28 Cent/m\(^2\) - depending on the soil fertility - the average annual income created by this instrument amounted to 20 million Euros between 2000 and 2008 and decreased continually (see Tab. 8). The Czech Ministries for Agriculture and Environment are currently preparing an amendment of the Act on the Protection of Agricultural Resources in order to increase the fees for withdrawal of land from the agricultural land resources.[24].

---

1 The law was enforced in Czechoslovakia in 1992. One year later Czechoslovakia dissolved peacefully into its constituent states the Czech Republic and Slovakia. This regulation was taken over by both countries.

2 Státní fond životního prostředí ČR
With regard to loss of agricultural land, three key aspects are regulated in order to minimise such a loss:

- A distinction of five soil quality classes is made, with special protection of the best two classes.
- A special permit is required for developments on agricultural land of good quality. For large development areas, such decisions are not made by the local municipality but are forwarded to higher level authorities.
- If a development on good agricultural is unavoidable (no alternative solution) there is an obligation to minimise the extent of land take as far as possible.

The soil classes are defined as follows:

- Class I: Soils judged most valuable in each climate region, which may be exempted from the agricultural fund only as an exception.
- Class II: Soils whose productivity is, within the climate region, above standard.
- Class III: Soils with average productivity and medium protection level, which may be used for construction purposes.
- Class IV: Soils mostly below average productivity, which may be used for construction purposes.
- Class V: Soils with very low productivity, which are considered dispensable for agricultural purposes, which may be used for construction purposes.

The permits for the conversion of agricultural land are issued at different authority levels depending on the size of the area in question.

- up to 1 ha - municipalities of the 3rd level
- from 1 to 10 ha - regional offices
- over 10 ha - Ministry of environment

The special conditions for the conversion of agricultural land to building land are specified in Article 4, which requires "If it is inevitable to take agricultural soil for non agricultural purposes, it is necessary 1/ to minimize disturbing of land consolidation and hydrology conditions, 2/ to minimize the area of the land taken, 3/ to minimize land management, especially in line constructions, 4/ after finishing construction works to take necessary
measures assure good agricultural management”.

For the protection of forest soils similarly conditions apply and are regulated in the Forest Act ³.

Tab. 13 Fees for the conversion of agricultural land

<table>
<thead>
<tr>
<th>Class of protection</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>CZK / ha</td>
<td>69.413</td>
<td>58.440</td>
<td>53.356</td>
<td>43.971</td>
<td>20.695</td>
</tr>
<tr>
<td>Euro / ha</td>
<td>2.776</td>
<td>2.338</td>
<td>2.134</td>
<td>1.759</td>
<td>0.828</td>
</tr>
<tr>
<td>Euro / m²</td>
<td>0.28</td>
<td>0.23</td>
<td>0.21</td>
<td>0.18</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Conclusions. Some experts are of the opinion that the regulation is rather ineffective in particular in the Prague agglomeration, where land take is enormous. The affected soils in this region are entirely of the best quality and there are no alternatives. Because of the economic pressure too many permits are issued. However, the overall statistics show a stagnation of loss of agricultural land since law enforcement

4.1.2 Compensation payments for agricultural land in Slovakia

The Slovakian system is very similar to the Czech Republic and is regulated by the Act on Protection and Utilisation of Agricultural Soil⁴. In total there are 9 soil classes and the best four classes are protected. The conversion of such land into building land is charged with a fee for each square meter of lost soil. The system is regulated by the regional agricultural bureaus, who can issue permissions to use agricultural soils. There is a detailed information system about protected and other soils available in order to manage agricultural soils. Major objective is to protect the best soils and to direct new development to sites with poor soil conditions.

The conversion of protected land to building land requires a fee, depending on the quality of the affected soil, ranging from 6 – 15 Euros per m², depending on the soil quality. Currently 21 % of the Slovakian agricultural soils are affected by this protection regime.

The fee on the use of agricultural land goes to a national funds, the income is used for soil protection and soil quality monitoring.

Tab. 14 Compensation payments for agricultural soils in Slovakia

<table>
<thead>
<tr>
<th>Percentage of total agricultural soils</th>
<th>Quantity in hectare</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly protected soils</td>
<td>3.9 %</td>
<td>99,800 ha</td>
</tr>
<tr>
<td>Strong protected soils</td>
<td>8.5 %</td>
<td>215,800 ha</td>
</tr>
<tr>
<td>Protected soils</td>
<td>5.8 %</td>
<td>147,300 ha</td>
</tr>
<tr>
<td>Less protected soils</td>
<td>2.9 %</td>
<td>72,700 ha</td>
</tr>
</tbody>
</table>

³ Act No. 289/1995 Coll.
⁴ No. 220/2004
Conclusions. Since independence Slovakia was highly affected by loss of agricultural land due to land developments and sealing. In the period of 1990 – 2008 the loss of agricultural land amounted to 33,116 hectare, corresponding to 1.3 % of the available agricultural land and to 5 hectares per day or 3.4 m² per inhabitant and year. In 2004 the Act on Protection and Utilisation of Agricultural Soil⁵ was enforced which represents a tool to mitigate the loss of agricultural soils and to steer new developments to soils of lower quality. “It would be worse without” is the common expert opinion in Slovakia.

Compensation measures build on the principle that soil consumption and hence the loss of soil functions (biodiversity, fertility, drainage capacity, erosion protection etc.) is compensated with restoration of soil functions somewhere else.

European practice. Compensation of ecological losses caused by major construction works exist in several countries. However, in most cases compensation mechanisms focus on ecological compensation in general and neglect the loss of unprotected soils. 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 there are legal demands that environmental compensation is carried out in the case of exploitation works. The German environmental compensation practice is most developed and considers also conventional soils. Compensation is co-ordinated by eco-account agencies in the German Federal States. In Austria a pilot application is currently planned which will be implemented in the Southern agglomeration of Vienna [140].

4.1.3 Ecological compensation for highway construction in the Netherlands

As early as 1993 the principle of ecological compensation to reduce ecological losses of major infrastructure projects (in particular highways) has been incorporated in Dutch governmental policy⁶. The overarching principle of the compensation mechanism is “prevent, limit, compensate”.

However, a recent survey states that compensation measures in the Netherlands proved to be inefficient. Only half of the land which was classified as to be compensated was actually compensated. Major reasons were the lack of severe sanctions if compensation was not carried out and the lack of simple procedures for investors. The survey concludes that in order to improve the system professional compensation banks or local compensation pools were necessary. This would ensure that compensation measures were carried out by experts [139].

4.1.4 Eco Accounts in the German Federal States

Background. In 2002 the National Nature Conservation Act⁷ was enforced, which requires that impacts to nature have to be compensated. This requirement does not only refer to loss of soils but also to major losses of biodiversity and species. The need for compensation is specified by the responsible planning authorities. Typical projects that would require compensation are for instance large infrastructure developments like the building of streets and air fields or new development plans of municipalities and cities. In the first enforcement phase compensation measures were carried out by the intruding parties themselves. This

---

⁵ Act No. 220/2004 Coll. on Protection and Use of Farmland  
⁶ Ecologische Hoofdstructuur (EHS), 1993  
⁷ BNatSchG 2002 (nature conservation act): compensation of an environmental Impact in the case of building measures. (§19; §21(1))
procedure was in many cases not satisfactory for both sides. Planning authorities were often confronted with a lack of quality regarding compensation measures and developers were confronted with additional complications regarding legal procedures. Besides that, the rules for compensation were not clearly defined. As a reaction to this unsatisfactory situation several Federal States introduced the Eco Account System, which is supposed to bring more fairness and transparency in the compensation process and is a clear facilitation of procedures for developers.

Methodology. The eco-account system is based on trading eco points. Developments requiring nature compensation measures according to the National Nature Conservation Act are charged with eco points. Developers have to prove that compensation measures of equal value are being carried out somewhere else. Eco points can be acquired at compensation agencies, which are officially authorised and carry out compensation measures. Compensation agencies are owners of Eco Accounts, selling eco points and are in charge of realising compensation measures. Typical compensation projects are for instance the improvement of

- biodiversity at habitats and protected landscapes,
- of agricultural practices by switching from intensive to extensive management forms
- and forest management practices.

Implementation. So far 21 authorized eco account agencies exist all over Germany. Their portfolio of compensation measures and their trading area differs considerably. Examples from German Federal States:

- **Hessen** was the first German Federal State, which implemented the Eco account system. Compensation measures are based on the regional Compensation Decree\(^8\) and are coordinated and supervised by the compensation agency Ökoagentur für Hessen\(^9\). The compensation agency coordinates all measures to be taken for compensation and thus separates compensation activities from the overall planning agenda and time schedule. The developer receives a certificate stating that compensation was done according to law and thus is able to proceed with the project concerned, while compensation is implemented in a coordinated and structured way on land that is appropriate (and not just available in short period of time) and without time pressure. Projects are done under scientific supervision, in cooperation with universities.
  - The portfolio of the agency includes currently 3 compensation projects, two being habitats, and one for agricultural practices; i.e. from intensive land use to extensive and/or organic agriculture. The price of one eco-point is defined per law with 0.35 €

- **Schleswig Holstein** Compensation measures are coordinated and supervised by the Ausgleichsagentur\(^10\). The agency is in charge of more than 40 compensation measures, all of which refer to the improvement of biodiversity at habitats and protected landscapes.

Costs: Preliminary information refers to costs for developers ranging between 1 – 5 Euros per m² land take and more than 5 Euros per m² sealed soil. In Hessen the costs for one Eco Point are officially fixed with 0.35 €. Sealing of soil with poor quality would roughly cost 20

\(^8\) Verordnung über die Durchführung von Kompensationsmaßnahmen, Ökokonten, deren Handelbarkeit und die Festsetzung von Ausgleichsabgaben (Kompensationsverordnung - KV) Vom 1. September 2005

\(^9\) Ökoagentur für Hessen (http://ökoagentur-hessen.de/)

\(^10\) Ausgleichsagentur SH GmbH (http://www.ausgleichsagentur.de/)
Eco Points or 7 Euro per m².

**Conclusions.** **Advantages.** The eco account system represents an added value for compensation measures. 1/ The quality of measures is better controlled, 2/ measures are pooled and larger projects are facilitated, 3/ the system provides more transparency and fairness, and 4/ the procedures are easier for developers. **Drawbacks.** Compensation measures 1/ are not focused on soil sealing and land take but on impacts to nature in general, 2/ there is no limitation to soil sealing or land take (it is just about extra costs), and 3/ the costs of compensation measures seem to be very moderate.

### 4.1.5 Soil compensation account in Dresden (Germany)

The most remarkable compensation measure is the *Soil Compensation Account* (Bodenausgleichskonto) of the city of Dresden which was established in the year 2002. Legal basis of this system is also the National Nature Conservation Act. Dresden has established a special compensation mechanism which focuses on desealing and removal of derelict buildings. Also noteworthy are the actual compensation fees, which are based on “real costs” of desealing and amount to approximately 20 € per m² desealed soil.

The City of Dresden has defined a long term planning target which declares that built-up land for settlements and traffic is to be confined to 40% of the total urban land. To meet this goal the city council established a “soil compensation account” (Bodenausgleichskonto). New developments on undeveloped land require adequate desealing measures or “greening” measures somewhere else but within the city boundaries. Developments in the inner urban area are usually exempted from compensation measures with the objective to steer inner urban developments and stop urban sprawl. Developers have the opportunity to carry out compensation measures by themselves or to pay a compensation fee to the Environment Authority of the City, who is in charge of several desealing projects.

Since 2000 the city monitors sealing and desealing within the city boarders. On average about 4 hectares are desealed per year (see Fig. 82).
Final Report  
Overview of best practices for limiting soil sealing or mitigating its effects in EU-27

Fig. 82 Development of desealing in Dresden
Source: City of Dresden (2009)

Conclusions. The soil compensation account of the city of Dresden clearly refers to desealing measures and the sealing policy of the city. According to the city planning authorities the measure is effective but is regarded as financial obstacle by investors. The compensation fee for sealing is considerably higher compared to other compensation measures, which focus merely on compensation of biodiversity losses (“planting a few shrubs is much cheaper than desealing and disposal of demolition rubble”). According to local experts the survival of this measure is in danger because it is perceived as barrier for investors as Saxony, with 12 %, has one of the highest unemployment rates among the German Federal states.

4.1.6 Landscape Compensation Account in the Vienna agglomeration (Austria)

In Austria a Landscape Compensation Account will be tested in a pilot implementation in the South of Vienna. The German Eco Account System serves as a role model.

In Lower Austria and in particular in the Southern Vienna agglomeration several large infrastructure projects will be realised in the near future. Among them are the enlargement of the Vienna airport, the extension of streets and railway network. All projects will result in severe impacts on soils and landscapes but cannot be realised somewhere else from a strategic point of view. In order to mitigate the effects of the planned projects compensation in the style of the German Eco Account system is planned. In a first step the City of Vienna and the adjoining province Lower Austria agreed on developing common compensation

11 Source: Wolfgang Socher (wsocher@dresden.de), Landeshauptstadt Dresden, Umweltamt
projects and on establishing a joint “Landscape Account”.

Conclusions. The Landscape Compensation Account in the Vienna Agglomeration is currently in the planning phase. The fact that the planning authorities of the city and the connected province are aiming to co-operate on compensation measures is highly innovative.

The planned projects are requiring compensation according to the Environmental Impact Assessment Directive. However, such compensations are usually handled very low level, since there are no clear guidelines and the control is almost nonexistent. The Landscape Compensation Account would mean an improvement of compensation measures at large, since larger projects would be facilitated and managed professionally.

4.2 Trading of soil certificates

The most remarkable compensation system is the trading of development certificates. The system has been intensively discussed in Germany and is considered to be the most effective measure to achieve sustainable land use on a short and long term basis. The overarching principle is to create a shortage of building land; this mechanism puts an enormous economic pressure on land use and triggers the implementation of all possible instruments to reduce land take. As a result functional soils are only converted to building land if no other option is in place.

The logic of the system is comparable to the CO₂ emission trading systems of the Kyoto Protocol. Key barrier of the trading system is its complexity, since it requires the establishment of an entire market with trading mechanisms and commonly accepted rules. Along the experiment Spiel.Raum the implementation of Tradable Development Certificates was simulated in 14 German municipalities of different size and all over Germany. The sample included a large diversity in terms of size - the largest municipality being Munich with one million inhabitants and the smallest cities with less than 10,000 inhabitants - and land use demand. The experiment was carried out over two years (Feb. 2007 – April 2009) and included four workshops and two trading phases.

Step 1: Calculation of future development land. Municipalities had to calculate their demand of building land for the next 15 years. The calculation had to respect common rules and the principles of efficient land use.

Step 2: Distribution of development certificates. All municipalities were assigned with development certificates according to the same rules. Two scenarios were considered, firstly a reduction of 13 % and secondly a reduction of 24 %. For example a municipality calculated their development need with 1,000 hectares. For scenario 1 they received development certificates worth 870 hectares and for scenario 2 only 760 hectares. The first distribution of development certificates is without any charges. The trading involves costs. The price per m² cannot be predicted but is dependant on the demand of certificates.

Step 3: Simulation of 15 year land development. The next 15 years were simulated. Municipalities had the choice to either go along with the stock of development certificates they received at the beginning or to engage themselves in trading development certificates. The first option means that a municipality uses their development certificates for their own

---

12 Environmental Impact Assessment

developments plus exploits all possible land use potentials, i.e. reuse of underused land, development of inner urban areas, renovation of existing buildings etc. The other option is to trade development certificates with other municipalities. Selling development certificates results in an income for municipalities. Acquiring certificates can also be economic if a municipality has a shortage of certificates and the planned development promises to outweigh the costs. In any case will municipalities aim to avoid consuming development certificates. The trading was simulated in two phases. Trading was possible via the internet and municipalities had to realise their development targets for streets, housing and business locations.

Conclusions. Results of the simulation revealed that both reduction targets (-13 % and -24 %) were reachable. Another observation was that most municipalities preferred to use their certificates in combination with efficient land use in stead of buying new certificates. This resulted in a rather moderate demand but also moderate supply. Key conclusions were:

- The trading mechanism strengthens the calculation of long term planning costs and the implementation of efficient land use management practices.
- For practical implementation it is necessary to achieve acceptance among decision makers and to build-up specific competence.
- With regard to the distribution of certificates it is difficult to achieve fairness and acceptance.

4.3 Summary

Three compensation systems and their practical application were analysed, namely compensation payments, compensation measures, and trading systems. The three systems refer to land take and only indirectly to soil sealing.

Compensations fees for valuable agricultural soils are currently charged in the Czech Republic and Slovakia.

1/ In the case of the Czech Republic the overall loss of valuable agricultural land stagnates since implementation of the legislation. However, the loss of top soils in the Prague agglomeration is still enormous as there are no alternative development areas in the region.

2/ In the case of Slovakia the loss of top quality agricultural soils is charged with 6-15 €/m². However, the annual loss of agricultural land is still at a very high level in Slovakia and the compensation fee is no barrier for investors.

In general compensation fees mitigate the loss of agricultural soils and steer wherever possible new developments to soils of lower quality. In both countries the income from the fee is used for soil research and statistics According to national experts the tool has “soothing effects” and the soil loss “would be worse without it”.

Compensation measures build on the principle that soil consumption and hence the loss of soil functions (biodiversity, fertility, drainage capacity, erosion protection etc.) is compensated with restoration of soil functions somewhere else. This principle is already realised in several German Federal States through eco accounts and is currently tested in Austria.

Compensation measures are usually not focused on soil sealing as such, but on land take and impacts to nature in general. The costs of compensation measures seem to be very moderate with on average less than 7 €/m². A remarkable version of the eco account system exists in Dresden, where actual sealing is compensated by desealing measures, which
average costs of 20 €/m². Although the Dresden system seems to be effective, experts from the city planning department are not sure if it will survive in the long term. With an unemployment rate of 12 %, Saxony is under enormous economic pressure and such measures could scare potential investors away.

**Trading systems.** A very promising variant of the compensation system is the trading of development certificates. The logic of the system is comparable to the CO₂ emission trading mechanisms of the Kyoto Protocol. The trading of soil certificates is currently at an experimental stage and was implemented in a simulation with 14 German municipalities. Results of the simulation revealed that two land take reduction targets (-13 % and -24 % annual land take compared to 2002) were reachable.

The trading mechanism strengthens the calculation of long term planning costs and the implementation of efficient land use management practices. Key barrier to the trading system is the lack of political commitment and its complexity; the system requires the establishment of an entire market with trading mechanisms and commonly accepted rules.