Michael Link

Cultural Landscapes in Poland between Tradition and Modern Day – Sustainable Development in the Conflict between Cultural Heritage and Economic Demands

After Poland became a member of the EU, the administrative conditions changed. The rural areas are experiencing a dynamic transformation from traditional land usage into a more economically based form aimed at intensifying production. This development process is, on the one hand, responsible for an increased effectiveness in production, yet, on the other hand, has a negative effect on the diversity of cultural landscapes. The change of agricultural structures in Central and Western Europe foremost affects the traditional farms in disadvantaged areas.

The increase in agricultural production intensity combined with the cessation of farming in former agricultural areas has resulted in a drastic decline in the variety of cultural landscape elements. Small-scale farmers in the peripheral regions of Poland have left farming. At the same time field sizes in regions with a high soil quality have increased.

The change in the Polish agricultural management structure should not lead to a decrease in the diversity of landscape elements and species. There is therefore a need to balance intensive agricultural production against the protection of historical cultural landscapes.

The cultural landscape in Central Europe in the course of time

During the last two centuries the Middle European landscape has significantly changed. At the beginning of the 19th century the semi-open park landscapes were characterised by thin out forests as well as heaths and pastures inside the forests. This kind of landscape structure appears to us today on old pictures as 'uncultivated', even though the landscape in former times was deeply influenced by human impact. At this time the original state of the landscape has long since vanished[1].

Sustainable development is not an actual invention or an idea of the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro in 1992. Because of the constantly increasing demand for wood for energy, building and mining at the beginning of the industrialisation (second half of the 18th century), wood and wood products became rare. As a result, the Forest Administration began searching for a sustainable way to solve the wood shortage by limiting the removal of wood to the amount wood that could be grown during the same time[2].

[1] Konold 1996.
[2] Haber 1994.

Fig. 1: Extensively used agricultural landscape in the Hessian Lahn-Dill-Uplands

At the middle of the 19th century the species richness in Germany achieved a maximum. The reason was a country-wide dominating extensive way of land usage connected with a huge number of different vegetation and biotope types[3].

Another important break for the development of the cultural landscape was the invention of the mineral fertilisation by Justus von Liebig[4]. The rationalisation and intensification of agricultural land use since 1850 would not have been possible without his invention.

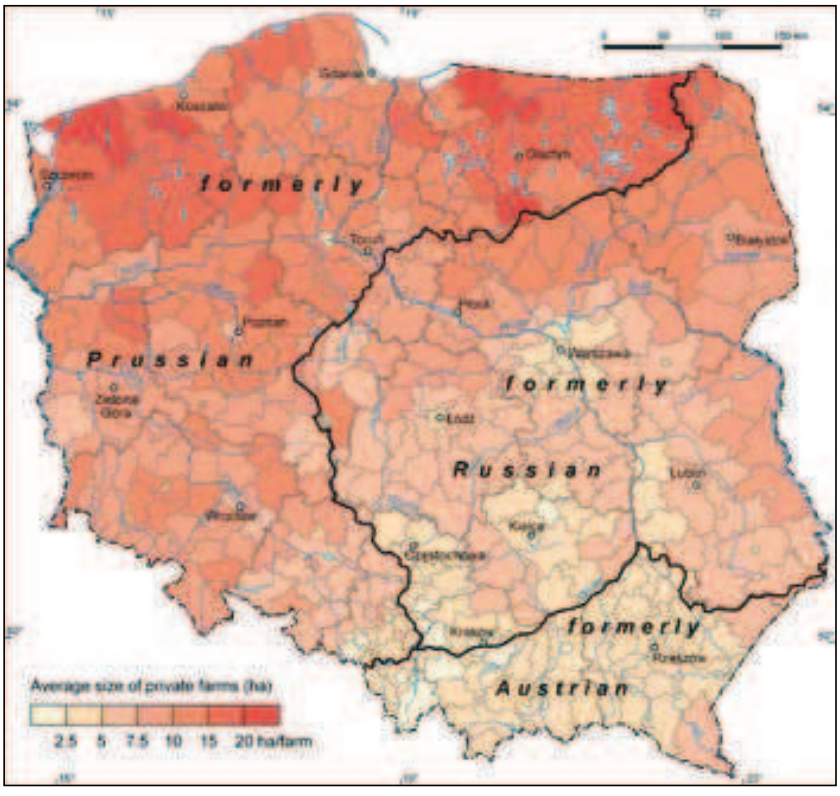
However it lasted about 100 years before the landscape changes became common in Central and Western Europe. Extensively used agricultural landscapes, which were rich in species and historical landscape elements, became very rare in this area after World War II (fig. 1).

Changes in agricultural structure (rationalisation and intensification of farming), characteristically ameliorations of soils on huge areas (⇒ levelling of site factors), simplifications of crop rotation (⇒ less number of useful plants) as well as increasing field sizes (⇒ lost of small sized structures and boundary line density inside the cultural landscape) led to a massive decrease of species. This process of degradation and devastation, as well as a loss of identification with the historical landscape character that was supported by the agricultural policy of the last 50 years, has produced huge, monotonous and only for the intensive agricultural production valuable, 'Modern Agricultural Landscapes'.

[3] Korneck et al. 1996.
[4] Liebig 1846.

Fig. 2: Huge sized economically based rationalized land usage in Silesia west of Wrocław (Breslau)

Fig. 3: Average size of private farms in Poland in relation to the historical borders from 1795 to 1918 (changed after Mydel 2001)



In Poland the intensive and huge sized economically based agricultural production can especially be found in the former German parts in the northern (former Pomerania, West and East Prussia) and western regions (former Lower and Upper Silesia) (fig. 2 and 3).

Figure 3 shows a northwest to southeast aligned gradient in the average size of private farms in Poland, a gradient that reflects the Polish Division from 1795 to 1918.

Sustainable landscape development based on ecological landscape analysis

Ecological landscape analysis deals with three levels of investigation (fig. 4). These three layers are based on the vertical structure of landscape.

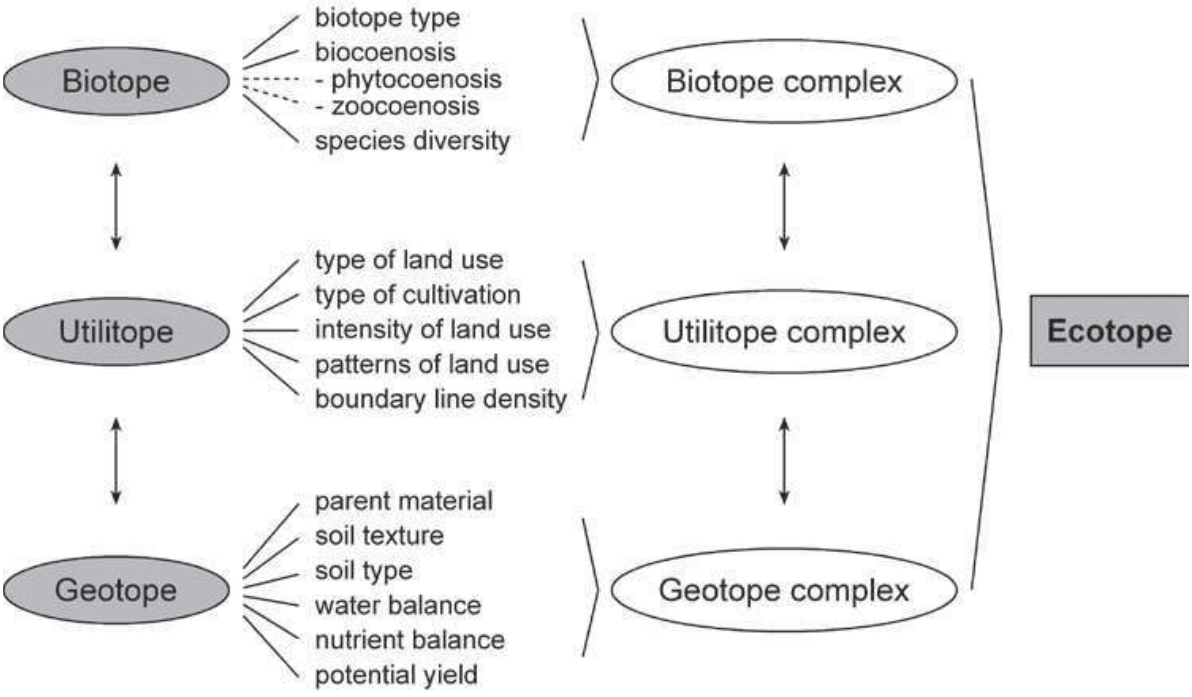
Geotopes are fundamental layers for ecological landscape analysis. The geotope includes information about the lithosphere, pedosphere and hydrosphere. One of the main factors to evaluate the ecological meaning of sites is the available water capacity connected with the depth of rooting (fig. 6). Sites with extreme water balance (wet ↔ dry) or high soil moisture change usually have a very high degree of biodiversity. The nutrient availability is another important factor for shaping biodiversity of landscapes.

Biotopes are very significant patterns to structure the vegetation layer of biosphere. There are different levels of intensity to investigate and measure biotopes. Assessments of flora and vegetation (general floristic sample, floristic types, phytocoenoses) are very exact, but large-scale. These methods are only practical for smaller areas. The assessment of biotope types is more efficient for vegetation research across broad landscapes. Inside a hierarchical system, biotope types are divided in subtypes.

There are several factors subdividing biotope types: (1) base-saturation of parent material, (2) degree of moisture, (3) nutrient supply (trophic status) of sites or rather soils, (4) altitudinal belts etc. To classify biotope types in case of species richness and ecological quality of phytocoenoses, it is necessary to locate characteristic areas for evaluation.

Utilitopes in shift from geotope to biotope are man made. They have an important meaning particularly in cultural landscapes. Natural landscapes are also influenced by mankind (e. g. air pollution, sinking depth of ground water).

Fig. 4: Structure of ecological landscape analysis



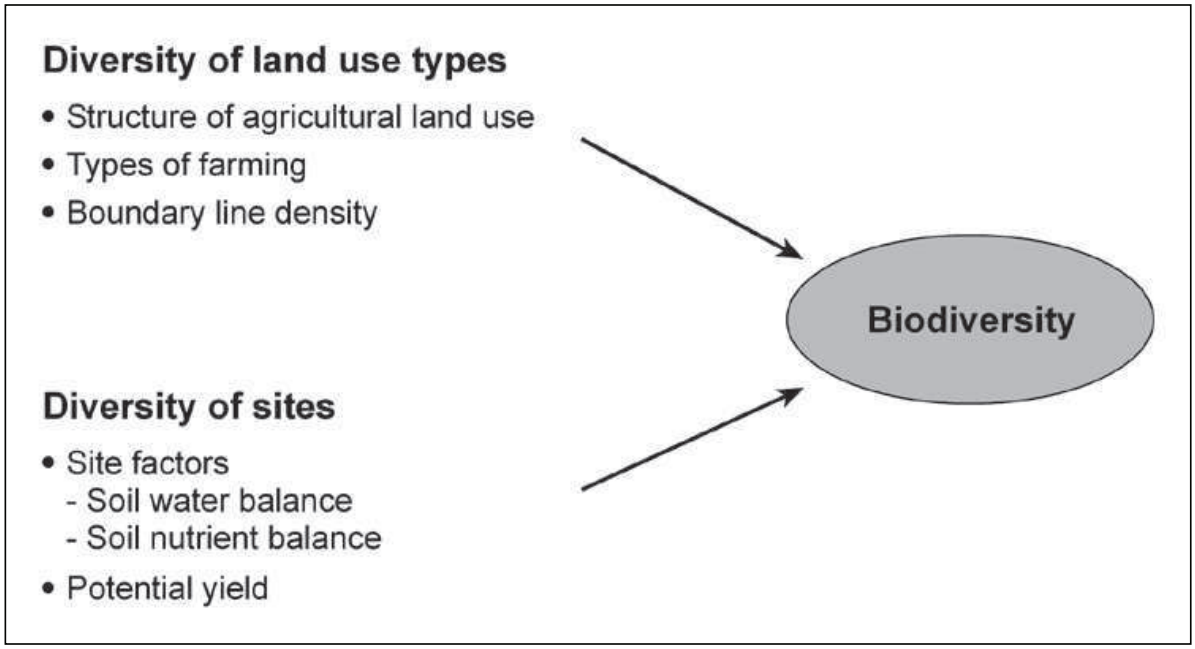


Fig. 5: Controls on biodiversity in agricultural andscapes

Geotopes, utilitopes and biotopes with more or less similar ecological quality (e. g. dividing wetland biotopes into groups of different nutrient availability) are unified into complexes. By overlaying geotope, utilitope and biotope complexes, ecotopes are created (fig. 4).

What factors are influencing the biodiversity of cultural landscapes?

The diversity of species appearing in a cultural landscape is caused by the diversity of species in the area of anthropogenic structural elements (agriculturally used areas like fields and grassland etc. as well as unused areas like ditches, hedges and baulks etc.) as well as biotopes with a high degree of naturalness (natural forests, pit boxes etc.). For spatio-temporal consideration it is especially important to observe the species of anthropogenic biotopes which are strongly bounded to historical types of land usage (e. g. calcareous semi-dry meadows, 'tussock' grass lands, litter-straw meadows)[5].

The biodiversity of typical agricultural landscapes such as those in Central Poland is based on the variety of sites (fig. 5), that is on the natural growing conditions (climate, geology, geomorphology, soils and hydrology). Soil moisture is highly influential on the variety of sites and their characteristic combination of species. A decisive parameter to classify important functions of soils is the available water capacity in the root zone. Soils with high available water capacity in the root zone and high yield potential have low values for nature conservation. In contrast, sites with low available water capacity and low yield potential are characterized by a high ecological quality (fig. 6)[6].

[5] Harrach & Sauer 2002.
[6] Link et al. 2007.

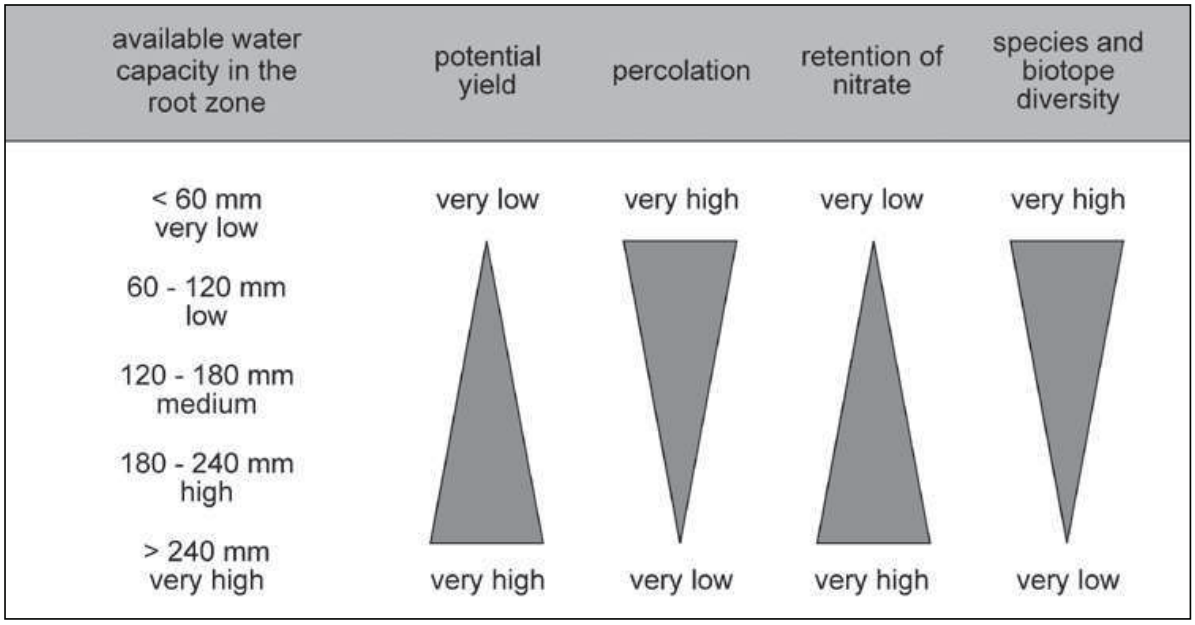
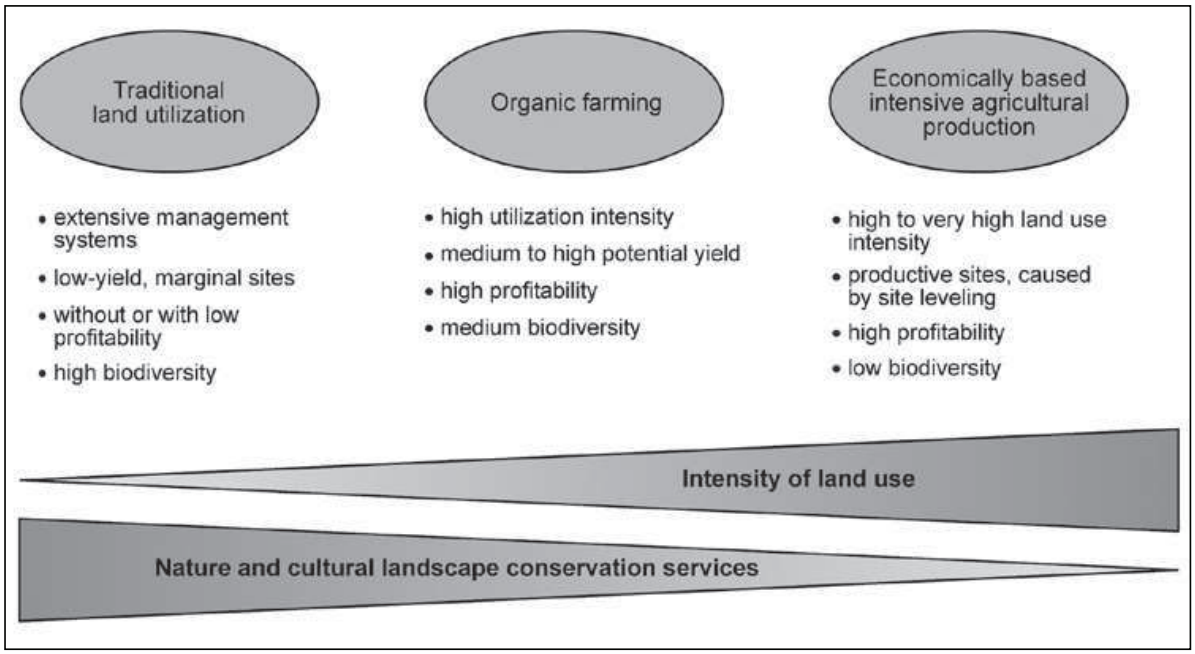


Fig. 6: Influence of the available water capacity in the root zone on several soil functions (after Harrach & Sauer 2002)

The anthropogenic impact has to be considered as a further important factor in explaining the biodiversity of agricultural landscapes. The diversity of land use types is mainly defined by the structure of agricultural land use (e. g. field size, shape of fields) as well as the type of farming (types of agricultural production intensity, fig. 7). The differing density of boundary lines inside agricultural landscapes is a result of different kinds of land usage (extensive ↔ intensive) and also very useful for analysing the diversity of land use. The biodiversity of agricultural landscapes can be understood as the result of site factors and land use affected parameters (fig. 5).

Fig. 7: Influence of the three main types of farming on nature and cultural landscape conservation



There is a strong connection between the biodiversity in agricultural landscapes and the different types of land use. Economically based intensive agricultural farming, organic farming and traditional land utilisation represent the three main types of land usage or types of land use intensity (fig. 7). The economically based, intensive agricultural production is less concerned with the species and biotope protection. In contrast, traditional land utilisation, like that practiced in Poland jet, places a high value on the protection of nature and cultural landscapes[7].

Fig. 8: Typical part of the Central Polish agrarian shaped landscape south from Łódź

[7] Link 2005.

Fig. 9: Traditional land use with field patterns of narrow and long stripes south from Łódź

The traditional cultural landscape of Central Poland

The cultural landscape of Central Poland today is characterised by field patterns of narrow and long stripes as well as traditional forms of land utilisation with partly historical land usage systems (fig. 8 and 9).

Since Poland became a part of the EU, the dynamic of landscape development in Central Poland has became much faster, agricultural areas have been enlarged and the farm management has intensified. Still, there remains a mosaic of antiquated and modern types of land utilisation, which causes a high diversification of landscapes and landscape elements as well as a high to very high biological diversity. This variety is, on the one hand, threatened by intensification of land use activities and, on the other hand, by cessation of farming[8].

Biodiversity of the cultural landscape in Central Poland

The agricultural landscape of Central Poland is characterized by a medium to high phytodiversity as a whole. As figure 10 shows, there are considerable differences in species diversity caused by the type of land usage.

[8] Link 2004.

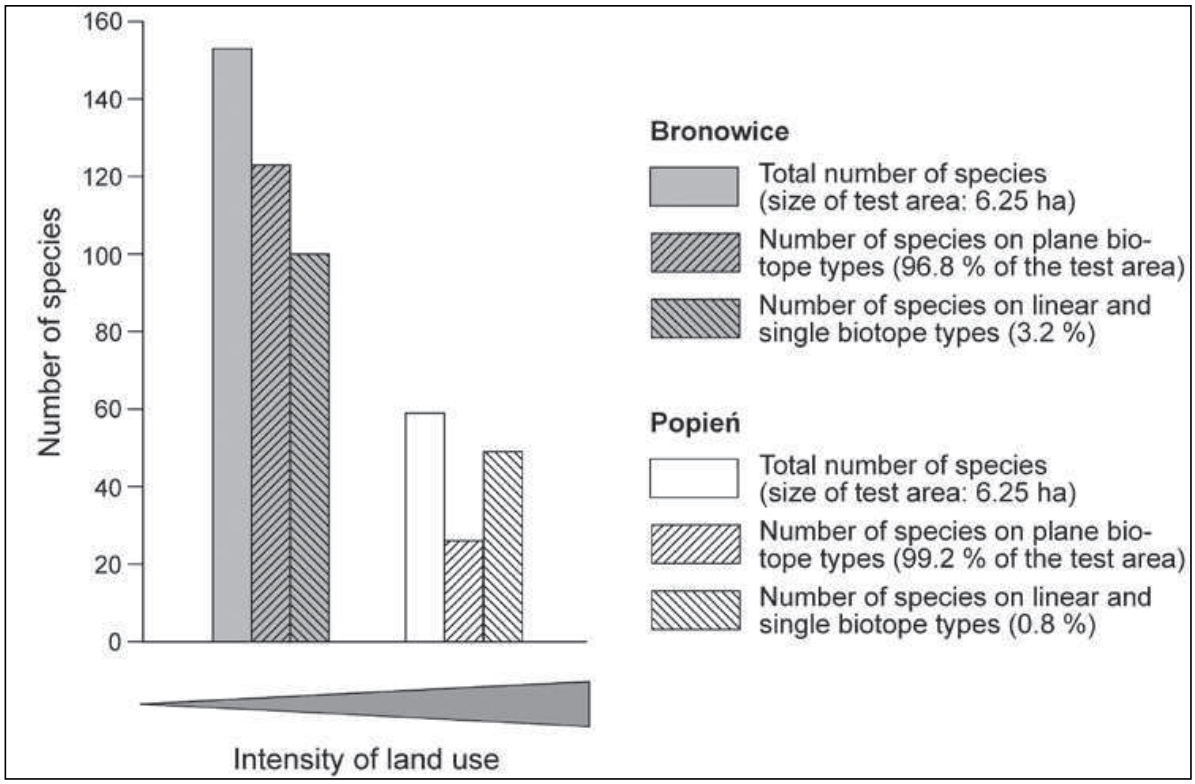


Fig. 10: Phytodiversity of the test areas Bronowice and Popień (about 25 km east from Łódź)

On the extensively used field patterns of narrow and long stripes at the test area Bronowice (fig. 11, size of each test area 6.25 ha) 153 vascular plants are present. On plane biotype types there are 123 plant species, and on linear and single biotope types 100 species.

At the intensively managed, large-sized test area Popień, the picture is much different. In the entire area there are only 59 species. The relation between the number of plane biotope types (26 species) and linear biotope types (49 species) is changed. From this point of view it can be concluded that the ecological function of linear small scale structures[9] inside intensively used agricultural landscapes is very important even if they appear only on 0.8 % of the whole surface as in test area Popień.

Compared with the number of species in the natural unit Łódź Hills surrounding the test areas there can be found on site of the test area Bronowice 28.6 % and at Popień 11.0 % of every species in this region. The differences in land use intensity between Bronowice and Popień causes a decrease of about 20 % of the phytodiversity related to the whole area of the natural unit Łódź Hills.

How can the biodiversity of the agricultural landscapes in Central Poland be protected sustainable?

The change of the agricultural structures in Poland is in progress since the transformation into an economically orientated state with the end of socialist era. Since Poland joined the EU this

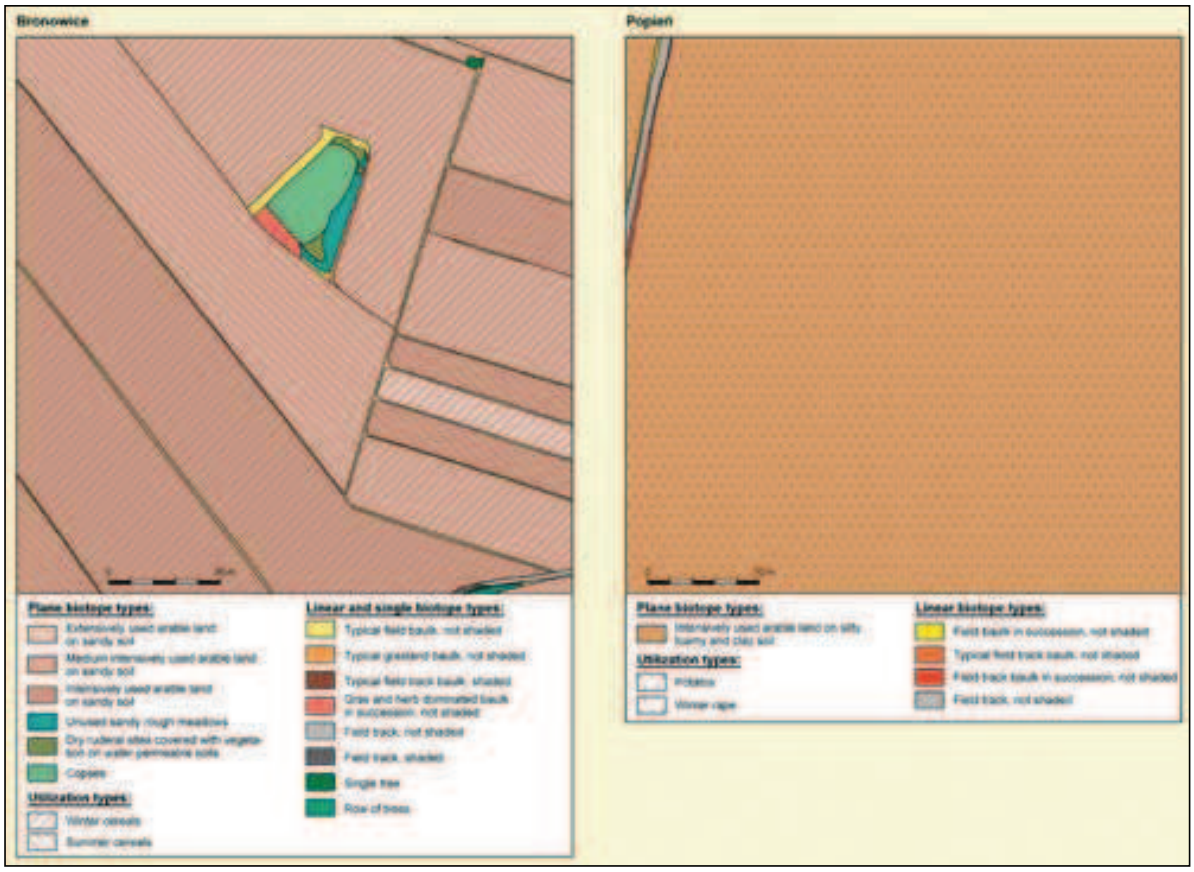


Fig. 11: Biotope and land use type map of the test areas Bronowice and Popień.

process has accelerated. As has been observed in the European agricultural landscapes with a high share of economically orientated rationalized types of land usage, the change of agricultural structures provokes a massive loss of species[10]. That suggests a future decline in biodiversity in Poland.

The agricultural land utilisation in Poland is evaluated in the context of the current, mainly economically focused, discussion mostly as a 'problem'. If these 'faults' of Polish agriculture such as low productivity, low specialisation and technical backwardness are examined without considering the ecological and politico-economical consequences for the future costs of a one-sided agricultural change, there will appear the same negative consequences on the agricultural ecosystems as it can be observed in the much more rationalized western states of Europe. The decrease of biodiversity in the western states of Europe was first of all an effect of reduction of historical landscape elements and intensification of land use.

The basis for the political decisions and planning acts to protect biodiversity and historical landscape structures of Central Poland are mainly: (1) the site factors, (2) the structure of the elements of the historical agricultural landscape, (3) the intensity of land use as well as (4) the profitability of the land use types.

[9] Link 2006.
[10] E. g. Barthlott & Winiger 2001 and Konold 1996.

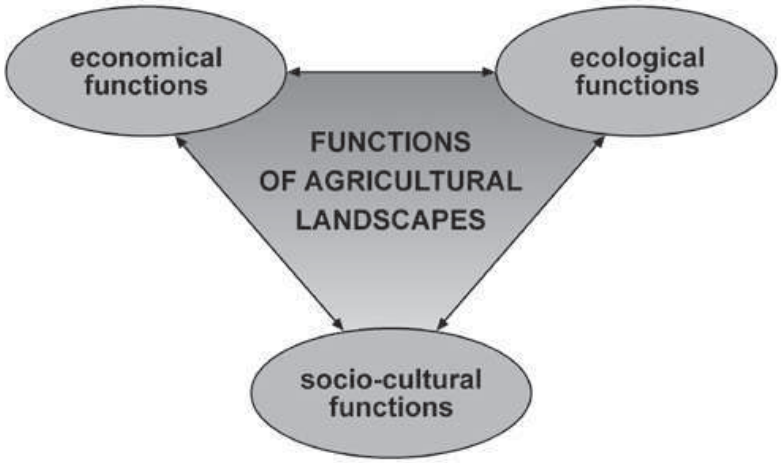


Fig. 12: Multifunctional land use as a basis for sustainable development of cultural landscapes.

The interests of many different land users – farming, nature conservation, tourism etc. – have to be balanced in the process of planning and politically decision. For a sustainable development of the agricultural landscape in Central Poland it is necessary to find practicably and feasibly models and fixed goals to reach (fig. 12).

Basically the dynamic development of cultural landscapes should be supported; stagnation, or the building of a museum out of historical landscapes, is counterproductive. A socio-economic base is the main condition to give the people the chance to remain inside structural weak country sides. This base can also be created within the implementation of ecological aspects into regional policy, e. g. landscape protection measurements supported and financed by the EU.

Fig. 13: Model ('Leitbild') for a sustainable development of agrarian shaped landscapes in Central Poland (natural unit Łódź Hills east from Łódź).

The following principally aspects should be considered concerning the protection of biodiversity and historical landscape structures in the agricultural landscape of Central Poland:

- Sustainable nature and landscape conservation are only useful as well as possible within sustainable farming.
- Nature and landscape conservation services managed by farmers must be financially supported by the public administration.
- The intensity of land use has to be related to the site factors.

The future model ('Leitbild') for the development of the agricultural landscape in Central Poland should be orientated according the principles of multifunctional landscapes[11]. A compromise between economical, ecological and socio-cultural demands on cultural landscapes in Central Poland could be implemented between the extensive and intensive land use options Bronowice and Popień (fig. 10 and 11). Figure 13 shows us a part of the Łódź Hill landscape, which represents an example for a multifunctional landscape development model that includes as many spatial requirements as possible.

References

Barthlott, W./ Winiger, M. (eds.) 2001: Biodiversity – A Challenge for Development Research and Policy, 2. Edition, Berlin/ Heidelberg/ New York 2001.

Brandt, J./ Vejre, H. (eds.) 2004: Multifunctional Landscapes – Volume I: Theory, Values and History (= Advances in Ecological Sciences, Vol. 14), Southampton/ Boston 2004.

Haber, W. 1994: Ist „Nachhaltigkeit" (sustainability) ein tragfähiges ökologisches Konzept?, in: Pfadenhauer, J. (ed.): 23. Jahrestagung der Gesellschaft für Ökologie, Innsbruck 1993 (= Verhandlungen der Gesellschaft für Ökologie, Bd. 23), Freising-Weihenstephan 1994, pp. 7-17.

Harrach, T./ Sauer, S. 2002: Zeitliche und räumliche Aspekte der Beziehung von Landwirtschaft und Naturschutz aus bodenkundlicher Sicht, in: Akademie für die Ländlichen Räume Schleswig-Holsteins (ed.): Naturschutz und Landwirtschaft – neue Überlegungen und Konzepte, Eckernförde 2002, pp. 130-148.

Konold, W. (ed.) 1996: Naturlandschaft – Kulturlandschaft: Die Veränderung der Landschaften nach der Nutzbarmachung durch den Menschen, Landsberg 1996.

Korneck, D./ Schnittler, M./ Vollmer, I. 1996: Rote Liste der Farn- und Blütenpflanzen (Pteridophyta et Spermatophyta) Deutschlands, in: Bundesamt für Naturschutz (ed.): Rote Liste gefährdeter Pflanzen Deutschlands (= Schriftenreihe für Vegetationskunde, H. 28), Bonn – Bad Godesberg 1996, pp. 21-187.

Liebig, J. 1846: Die Chemie in ihrer Anwendung auf Agricultur und Physiologie, 6. Auflage, Braunschweig 1846.

Link, M. 2004: Die biologische Vielfalt Mittelpolens im Wandel – Lässt sich Biodiversität auch unter veränderten agrarpolitischen Bedingungen erhalten?, in: Spiegel der Forschung 21, 2004, H. 1/2, pp. 34-41.

Link, M. 2005: Einflussgrößen, Zustand und Möglichkeiten der Sicherung biologischer Vielfalt in der Agrarlandschaft Mittelpolens, in: Bundesamt für Naturschutz (ed.): Treffpunkt biologische Vielfalt: Aktuelle Forschung im Rahmen des Übereinkommens über die biologische Vielfalt, vorgestellt auf einer wissenschaftlichen Expertentagung an der Internationalen Naturschutzakademie Insel Vilm vom 23.-27. August 2004 (= Treffpunkt biologische Vielfalt, Bd. 5), Bonn – Bad Godesberg 2005, pp. 137-143.

Link, M. 2006: Funktionen gras- und krautdominierter linearer Strukturelemente in der Kulturlandschaft und deren Bedeutung für den Arten- und Biotopschutz, in: Büchs, W. (red.): Möglichkeiten und Grenzen der Ökologisierung der Landwirtschaft – wissenschaftliche Grundlagen und praktische Erfahrungen – Beiträge aus dem Arbeitskreis „Agrarökologie" (= Mitteilungen aus der Biologischen Bundesanstalt für Land- und Forstwirtschaft, Bd. 403), Berlin – Dahlem 2006, pp. 125-135.

Link, M./ Kowalkowski, A./ Niewiadomski, A./ Harrach, T. 2007: Die polnische Bodenschätzung und Möglichkeiten der ökologischen Interpretation ihrer Ergebnisse, in: Mitteilungen der Deutschen Bodenkundlichen Gesellschaft, 110, 2007, H.2, pp. 571-572.

Mydel, R. (red.) 2001: Atlas Polski – Tom 1: Przyroda – Społeczeństwo – Gospodarka, Krakau 2001.

[11] Brandt & Vejre 2004, fig. 12

CULTURAL HERITAGE AND LANDSCAPES IN EUROPE
LANDSCHAFTEN: KULTURELLES ERBE IN EUROPA

Proceedings of the International Conference, Bochum
June 8-10, 2007

edited by
Christoph Bartels and
Claudia Küpper-Eichas

Bochum 2008

Veröffentlichungen aus den Deutschen Bergbau-Museum Bochum, Nr. 161

Die Deutsche Bibliothek – CIP-Einheitsaufnahme

Cultural Heritage and Landscapes in Europe – Landschaften: Kulturelles Erbe in Europa
Christoph Bartels/ Claudia Küpper-Eichas

Bibliographische Information der Deutschen Bibliothek

Die Deutsche Bibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie;
detaillierte bibliografische Daten sind im Internet über http:/dnd.ddb.de abrufbar

Herausgeber/ Editors: Christoph Bartels, Claudia Küpper-Eichas
Übersetzungen/ Translations: Katja Fladkov, Catherine Hempel, Ingrid Jaster
Illustrationen/ Illustrations: Autoren/ Authors

Gestaltung/ Design: Karina Schwunk (Deutsches Bergbau-Museum Bochum)
Herstellung/ Printed by: Grafisches Centum Cuno GmbH & Co.KG, Calbe

ISBN 10: 3-937203-36-2
13: 978-3-937203-36-2

Umschlagfotos:
Vorderseite oben: Bergbau-Folgelandschaft von Las Medulas, Spanien (J. Sanchez-Palencia)
Vorderseite unten: Dortmund, Westfalenpark (Foto R. Holtappel, Fotoarchiv Stiftung Ruhr Museum)
Rückseite: Urwaldsiedlung La Morada, Peru (I. Schjellerup)