

# LANDSCAPE ECOLOGY IN THEORY AND PRACTICE (SELECTED THEORETICAL AND META-SCIENTIFIC ASPECTS)

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## Abstract

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The development of a theoretical basis of landscape ecology is most important for its sustainable development and effective application in practice, because theory and practice are two inseparable and mutually dependent categories. There is to a certain degree lag in the development of landscape ecological theory to its practical application. This is a current undesirable feature of landscape ecology, and this discrepancy is caused by several objective and subjective reasons and – consequences, which are shortly analysed in this contribution.

*Key words:* theory, practice, balance and information flow of landscape ecology

## Introduction

The development of a theoretical basis of landscape ecology is most important for its sustainable development and effective application in practice, because theory and practice are two inseparable and mutually dependent categories. Landscape ecology is a science of mutual linkages, and of all influences existing between landscape ecosystems, including human impact, in space and time. Landscape ecology, as a frontier geographic-bio-ecological scientific discipline is characterised by different interpretations of theoretical questions, methodological approaches to the study of landscape structure, diversity, production, function, dynamics, and also the application of these results in practical life.

The theory and practice of landscape ecology are two inseparable and mutually dependent categories. The development of landscape ecological theory to a certain degree lags behind its application to practice. This is the current undesirable state of landscape ecology, and this discrepancy is caused by several objective and subjective reasons and consequences,

which are shortly analysed in this contribution. A very important indicator to sustain an approximate balance between the theory and practice of landscape ecology is the relationship between basic and applied landscape ecological research on the one hand, and the relationship between theory and experience on the other.

By strengthening theoretical landscape-ecological research and by rigorous theoretical landscape-ecological principles, it is possible to formulate regularities and principles of landscape ecology. Such regularities and principles make it possible to use and accelerate the generalized results of basic empirical and applied landscape ecological research to all studied territories. In this way, landscape ecological field research can be more efficient, faster and more economical, and we can strengthen the nomothetical character of landscape ecology and simultaneously also its position among other sciences.

The following remarks reflect the importance of theory and practice in landscape ecology:

The theory of the landscape ecology is based on the most generalised and abstract level of basic and applied landscape ecology in its terms, ideas, empirical data and research methods.

The aim of *basic scientific research* is to obtain an objectively true image of the studied object, phenomenon or process. Basic research aims to discover really new findings about objects, phenomena and processes, and to generalise these results in new generally valid laws on an empirical, experimental and theoretical level. Programmes of basic research should have a primarily heuristic, synthetic and anticipatory character.

The aim of *applied research* is to satisfy the multitude of needs of society, or of the individual, in everyday activity either by purpose oriented transformation of the already existing results of basic research or by working out the necessary results of basic research ad hoc and then processing them in a problem oriented way. A typical feature of applied research is the social requirement. But to fulfil such tasks, basic as well as applied research has to create the necessary theoretical basis and associated methodological instruments.

The importance of the theory of landscape ecology for its sustainable development flows initially from the following:

- to work out theoretical regularities and principles and to maintain information flow between theoretical and meta-scientific principles of landscape ecology;
- to reach a qualitative and quantitative balance between basic and applied research and to accelerate basic and applied landscape ecological research;
- to formulate the prognosis of the development of landscape ecology theory;
- to implement the research of results of theoretical landscape ecology by definition of landscape ecology identity, and
- to obtain a balance between the nomothetical and idiographical character of landscape ecology.

Formulation of the *theoretical principles of landscape ecology* is very important for the development of theory of landscape ecology to obtain a well-balanced relationship between the theory and practice of landscape ecology. The theoretical principles of landscape ecology

present the highest generalization degree that is a regularity of accumulated spatial-empirical knowledge and results of basic and applied landscape-ecological research for a long time, most importantly in results of research of landscape ecological processes and the pattern of ecosystems complex at the landscape ecological scale. The theoretical principles of landscape ecology, e.g. principles of the structure and function, biodiversity, flow of organism species, redistribution of nutriments, flow of energy, landscape changes and stability (Forman, Godron, 1993) create the core of theoretical landscape ecology.

*Meta-scientific principles of landscape ecology* should present the highest generalization degree that is a regularity of accumulated knowledge and results of meta-scientific orientated landscape-ecological research for a long time too. But the meta-scientific principles of landscape ecology are not developed like the theoretical principles of landscape ecology. These include (1) the principle of inseparability of geographical and ecological entity of landscape ecology, (2) the principle of stability of landscape ecology, (3) principle of integration of landscape ecology, (4) principle of information flow of landscape ecology, (5) the principle of efficiency of landscape ecology and (6) the principle of sustainable development of landscape ecology. From this point of view we must in the future intensively develop these meta-scientific principles, which create the core of meta-landscape ecology.

The theoretical and meta-scientific principles of landscape ecology are not isolated but these mutually influence and enrich each other. The theoretical landscape ecological principles deliver generalised knowledge from basic and applied landscape ecological research to meta-scientific principles of landscape ecology and enrich these with information about landscape, and vice versa the meta-scientific principles of landscape ecology offer information about the development of landscape ecology, which is necessary to provide identity and authenticity of theoretical principles of landscape ecology. (Žigrai, 2009a).

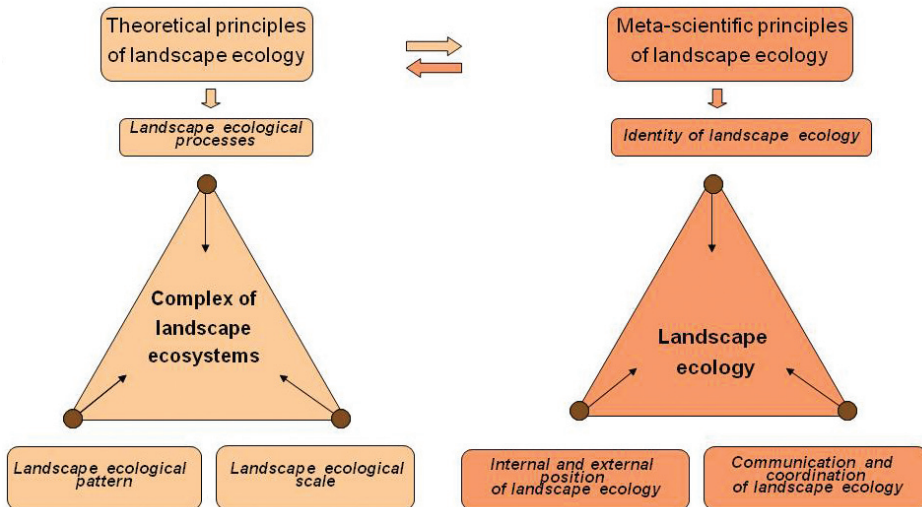


Fig. 1. Scheme of main categories and relationships of landscape ecology and meta-landscape ecology related to theoretical and meta-scientific principles of landscape ecology..

A qualitative and quantitative balance between basic and applied research is one of the most important pre-conditions for the successful development of every scientific discipline, not excluding landscape ecology. In the relationship between basic and applied research, it is also true that when there is a greater quantity and wider spectrum of obtained new data about objects, phenomena and processes spatially identifiable and interpretable for the needs of applied research, this data can be more effectively transformed for applied use. At the same time this increases the force of argument of the applied research in practice, which improves the quality of the decision making process on the political level. This also increases the social weight, – that is the acceptance of applied research, which leads to greater financial support for basic research from the side of society in the form of a social demand. The information given above shows that the relationship between basic and applied landscape ecological research is to a significant degree determined by the relationship between the possibilities of the scientific supply of basic and applied research on one hand and the quantitative- qualitative social demand, that is satisfaction of the varied needs of society and the individual on the other. For the relationship between scientific provision and social demand to function, it is also necessary to accept the upper limit of the carrying capacity of the application of the results of basic landscape ecological research for the needs of applied landscape ecological research (internal condition of functioning of this relationship), as well as the maintenance of the lower limit, the social-financial limit (external condition of the functioning of this relationship). (for more detail see Žigrai,1996).

*Formulation of prognosis of the development of theory and practice of landscape ecology* is one of the most important tasks of theoretical landscape ecology. This issue was not given much attention so far also due to the fact that the majority of landscape ecologists are more involved with methodological, empirical, and applied questions of the research object itself and dedicate only marginal attention to the prognostic of development of landscape ecological theory in the framework of the theoretical landscape ecology.

Theoretical landscape ecology deals with the theoretical questions of its two central research objects – landscape on the one side and landscape ecology as a science on the other. Meanwhile, it should be stressed that in the framework of this scientific research duality or ambivalence of theoretical landscape ecology, it was substantially more concerned with elaboration of theoretical-methodical and empirical-applied aspects than with the proper meta-scientific part of landscape ecology.

The most efficient action of *meta-landscape ecology* is naturally its effect on the development of theoretical-methodological landscape ecology situated closest to meta-landscape ecology in the inner sequential chain of landscape ecology. Additionally, until now it was precisely the theoretical landscape ecology that substituted the interests and mission of meta-landscape ecology. Establishment of meta-landscape ecology as an independent landscape ecological sub-discipline means easing the burden of the superstructure from theoretical landscape ecology which can thus solely concentrate on solutions to theoretical problems as the landscape is its central research subject.

The meta-landscape ecology can support with its meta-theory, methodology and meta-language the development of theoretical landscape ecology first of all by elaboration of the

theory of hierarchy, scale, and dimension of landscape and the processes taking place in it, enriching the theoretical basis of landscape ecology together with elaboration of the theory of spatial functionality and systemic coherence.

It is also very interesting to investigate the process itself and the mechanism of genesis of the individual theoretical landscape ecological paradigms, particularly where and how they rise and what they are carried by.

*The theoretical-methodological landscape-ecological paradigms* can be derived from the proper identity of landscape ecology, which is positioned on the intersection of the ecological and geographical research approaches.

*The applied landscape-ecological paradigms* are above all the generally accepted approaches and techniques, currents and schools of landscape-ecological or environmental planning in certain time and scientific space. Genesis of such kind of paradigms depends on the internal conditions of meta-scientific, theoretical-methodological, and empirical landscape-ecological and environmental research and their corresponding paradigms, as well as on the external order of practical planning.

Very important is the study of mechanisms of the genesis of meta-scientific, theoretical-methodological, -and applied landscape-ecological paradigms as the spiritual carriers of the development of proper landscape ecology. Research into the mechanism and conditions of origin, course, and extinction of these paradigms, which represent certain, transitionally valid scientific theories recognised by the landscape-ecological scientific community is of great meta-scientific and theoretical-methodological importance not only for the study of the development of landscape ecology, analysis of its present state-of-art, but also for outlining its future. (Kozová et al., 2007; Žigrai, 2002, 2007, 2008; Žigrai et al., 2007).

#### *Implementation of theoretical landscape ecological research by definition of identity of landscape ecology*

Based on the analysis of specialised literature and proper experience gathered during the long year of empirical, applied, and theoretical landscape-ecological research it can be admitted that the key problem in the theoretical development of landscape ecology was the search for its scientific identity.

This raises the following questions, whether landscape ecology represents a scientific discipline, methodical approach or activity or whether this is the case of the basic or applied science, whether it is a geographical or biological-ecological science, and -whether it should be a narrow-concentrated biocentric or widely conceived abio-, bio-, and humanistic-oriented research spectre or should its principle be partial or integrated, etc.

The lower illustrated scheme shows that the scientific identity of landscape ecology lies at the intersection point of landscape ecological research topics, goals and approaches. These landscape ecological research approaches consist of *geographical research approaches* (prevailing spatial-polycentric-holistic geosystemic with chiefly horizontal-vertical abiotic, biotic and human-geographical mutual relationships in the landscape) and *ecological research approaches* (prevailing function-biocentric, reduction-ecosystemic with chiefly

vertical-horizontal abiotic, biotic and human-ecological mutual relationships in the landscape). This consideration essentially corresponds to the definition of landscape ecology by Mičian (1999).

The specific feature of landscape ecology as a particular scientific discipline is in the contemporary and inseparable spatio-temporal representation of individual geographic and ecological research approaches to the solution of landscape-ecological issues obviously representing the most important meta-scientific principle and simultaneously characteristics of this ecological subdiscipline. (Žigrai, 2001a, 2003, 2006a, 2010a).

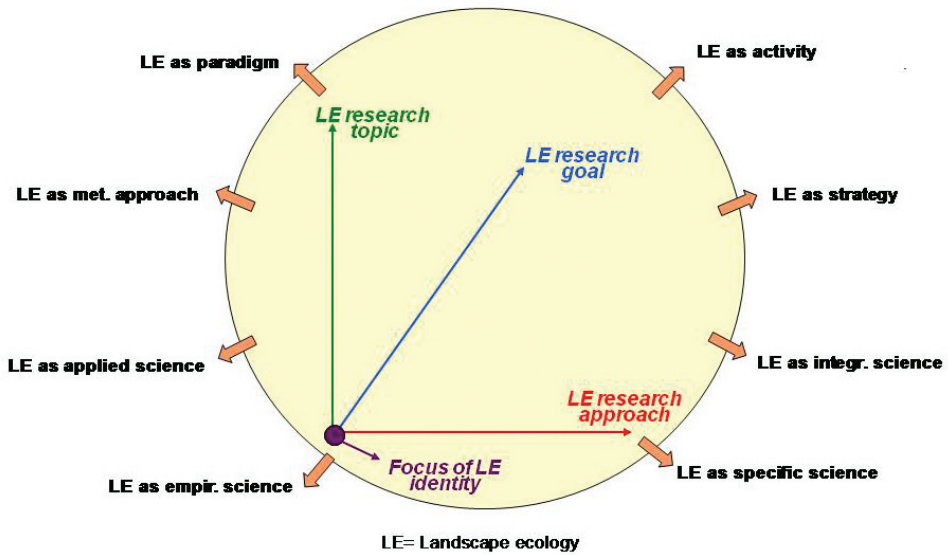


Fig. 2. Scheme of meta-scientific „compass“ seeking the scientific identity of landscape ecology.

Landscape ecology represents a certain platform for the coexistence of nomothetic and idiographic scientific-research approach and the balance between them. Landscape ecology simultaneously plays an important role of mediator between these scientific disciplines which contributes to its increasing scientific significance. Apart from that, such interpreted landscape ecology can contribute to palliation of the increasing discrepancy of economical and financial interests between universal, meaning prevalingly nomothetic, sciences and the regionally specific ones. It also means enhancing the scientific and social prestige for landscape ecology.

Delimitation of the position of landscape ecology among nomothetic and idiographic scientific disciplines by similar use of results obtained in the meta-scientific study of the position of geography among them is also interesting (Žigrai, 2006b).

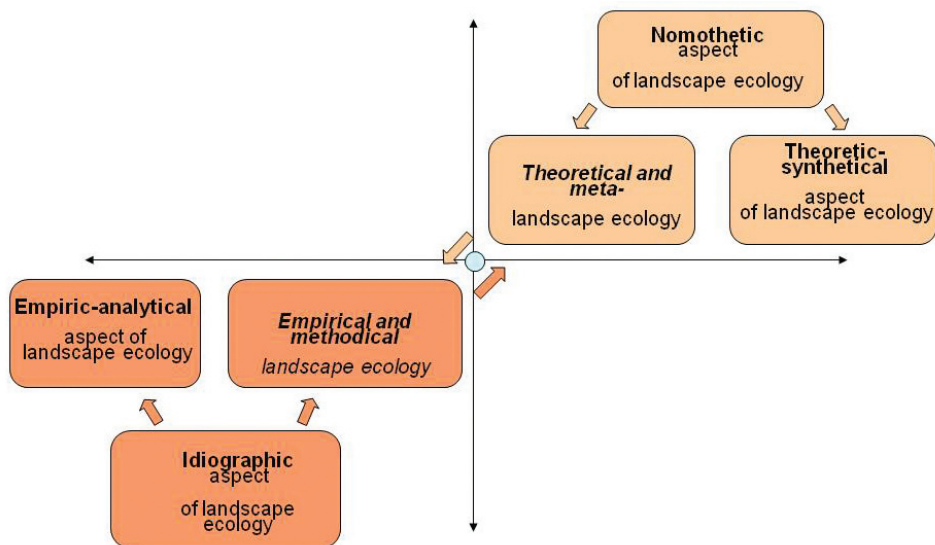


Fig. 3. Scheme of relationship between nomothetic and idiographic character of landscape ecology.

*Practice of landscape ecology* is the implementation of results of the basic empirical landscape ecological research for practical purposes e.g. landscape ecological planning and management with certain steps in interpretation, evaluation and proposition.

The importance of the practice of landscape ecology for its sustainable development flows from its various tasks is as follows:

- working out the theory and methodology of applied landscape ecology;
- solving the present-day practical ecological and environmental problems from a landscape ecological point of view and
- supporting the current ecological-political decision making for sustainable landscape and environmental development.

The implementation of theoretical and empirical knowledge of basic landscape ecological research in to practice currently presents a great challenge for landscape ecology. In this context, the burning question is to what extent landscape ecology is prepared as the science with the theoretical basis, methodological infrastructure, quantitative-qualitative nature of empirical knowledge to solve successful practical ecological and environmental issues from the landscape ecology point of view.

Landscape ecology, as the ecological scientific sub-discipline at the intersection of geographical-spatial and ecological-functional sciences has the great potential ability to apply the results of basic landscape ecological research in practice. There are two ways of applying the results of landscape ecological research to solve the problems of applied



landscape research, e. g for landscape transformation. Firstly, the inductive way e.g. the changed landscape-ecological properties as results of man 's impact on the landscape and secondly, the deductive way, e.g. the changed landscape ecological properties as indicators for landscape transformation.

*The multiple challenge of landscape ecology* for applied landscape research depends on its inner structure. This requires a certain demand for identification of causes, course and consequences of the applied landscape research, as well as of landscape-ecological infrastructure or facility which presents a certain scientific offer to solve this problem. The multiple challenge of landscape ecology for applied landscape research is based on two theoretical-methodological approaches represented by a meta-scientific model of landscape ecology and based on the most important meta-scientific principle of landscape ecology in the inseparability of the geographical spaciousness and ecological processes at the landscape scale. In this sense the multiple applied challenge of landscape ecology e.g. for landscape transformation research lies on conceptual, intra-disciplinary, interdisciplinary and trans-disciplinary (meta-scientific) levels. This is the area where landscape ecology can apply its interdisciplinary holistic thinking, -while emphasizing its professional landscape ecological identity. (Žigrai, 2009b).

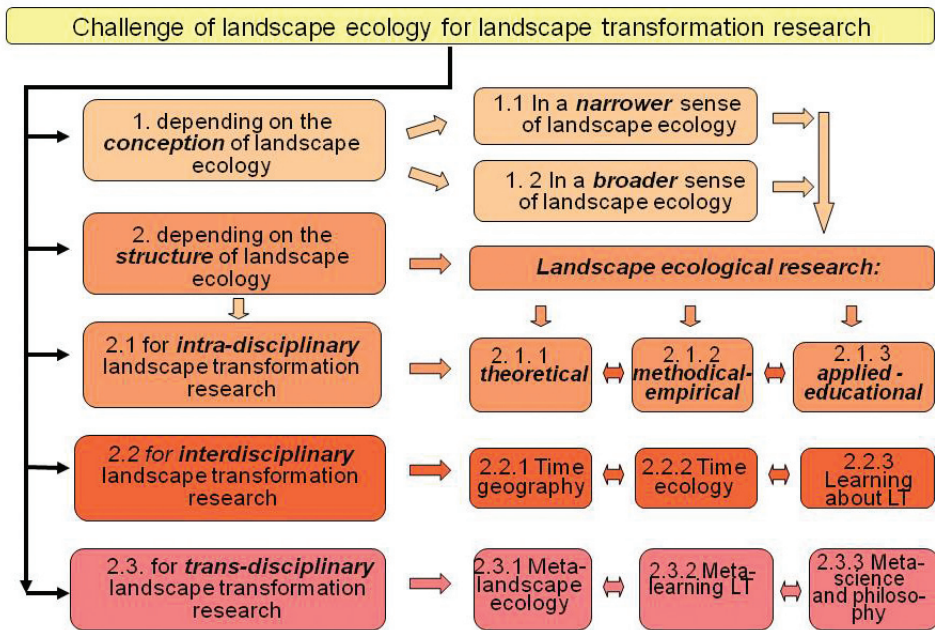


Fig. 4. Scheme of structure of landscape transformation related landscape ecological research.



There are two most important conditions to preserve the *sustainable development of theory and practice of landscape ecology*. Firstly, to provide the qualitative and quantitative balance between the development of theory and practice of landscape ecology and secondly to keep the mutual qualitative and quantitative information flow between theory and practice of landscape ecology-flows from its various tasks as follows: There is a narrow mutual information flow between the sustainable development of the theory of basic and applied landscape ecology and sustainable development of practice of landscape ecology.

The theory of basic and applied landscape ecology accelerates everyday praxis related to empirical landscape ecological research by analogy and extrapolation on the basis of theoretical regularities and on the principles of landscape ecology on one hand, and the sustainable development of the practice of landscape ecology creates new impulses of everyday praxis related to the empirical landscape ecological research for working out theoretical regularities and principles of landscape ecology.

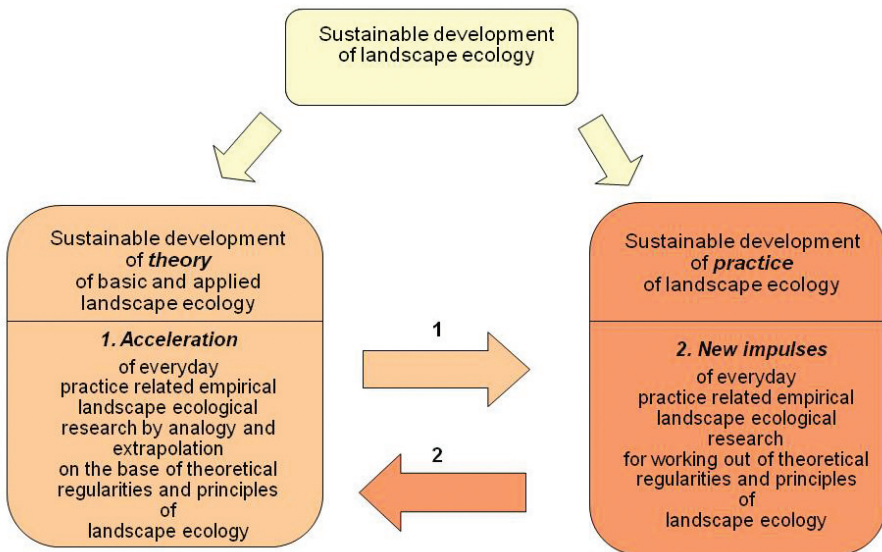


Fig. 5. Scheme of mutual information flow between sustainable development of theory and practice of landscape ecology.

This means that the importance of theoretical landscape ecology is given by the horizontal flow (transmission and transformation) of interdisciplinary data among theoretical landscape ecology, theoretical geography and theoretical ecology. The second importance of theoretical landscape ecology exists in the vertical flow-(transmission and transformation) of intra-disciplinary data between theoretical landscape ecology, methodical landscape ecology and

meta-landscape ecology. A similar situation occurs in a horizontal interdisciplinary flow of information between applied landscape ecology, applied geography and applied ecology on one hand and the vertical intra-disciplinary flow of information between applied landscape ecology, empirical landscape ecology and didactic landscape ecology.

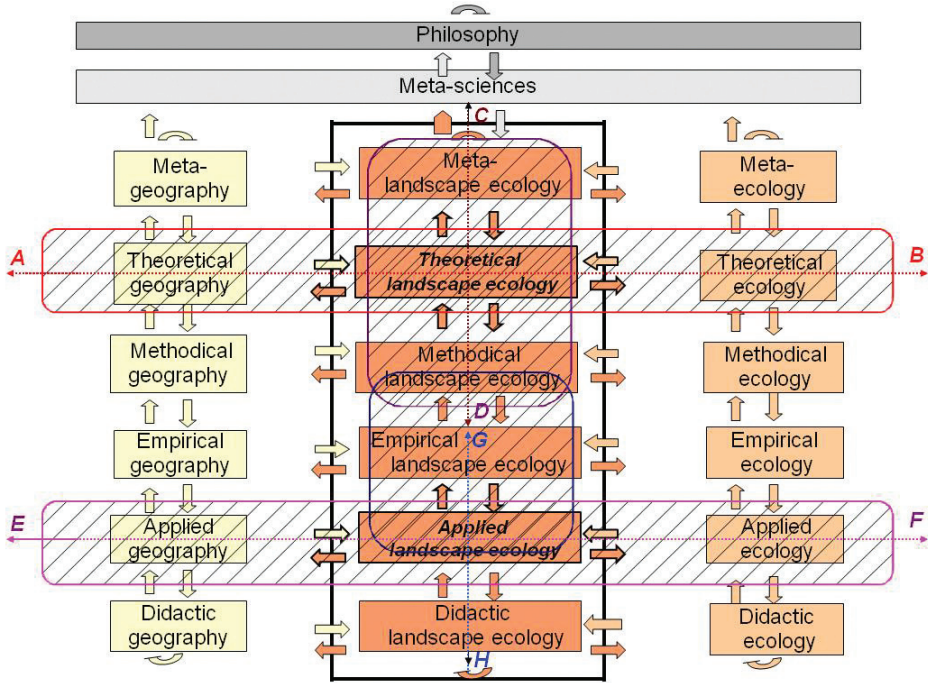


Fig. 6. Scheme of inter- and intra-disciplinary information flow of data between landscape ecology, geography and ecology.

*The balance between the theory and practice of landscape ecology and their information flow is the precondition for the stability and sustainable development of landscape ecology. This balance is presented by means of a scheme of typological square of landscape ecology. (Fig. 7 and Žigrai, 2010b).*

*The core of the theory of landscape ecology (A) consists first of all from a combination of landscape ecological conceptual type A1 (landscape ecology in „narrower“ sense, where the main research topic is a complex of ecosystems related to landscape pattern at landscape scale with „ecological“ landscape ecology with prevailing of ecological research approaches and elements of ecological gravitation field) with the landscape ecological structural type A2 (theoretical-methodological landscape ecology, where the main research approach is theoretical-methodological with basic landscape ecology, the main aim of which is to obtain an objectively true image of the studied object, phenomenon or process).*

The core of the practice of landscape ecology (D) consists primarily of combination of landscape ecological conceptual type D1 (landscape ecology in the „broader“ sense -the main research topic is the relationship between nature and man in the contextual comprehension of ecological-environmental problems of landscape) with „geographical“ landscape ecology with prevailing geographical research approaches and elements of geographical gravitation field) with landscape ecological structural type D2 (empirical-methodical landscape ecology where the main research approach is empirical-methodical – with applied landscape ecology, whose main aim is to satisfy the multitude of needs of society or of the individual in everyday activity either by purpose oriented transformation of the already existing results of basic research).

The landscape ecological conceptual types B1 (landscape ecology in the “narrower” sense and “geographical” landscape ecology) and C1 (landscape ecology in the “broader” sense and “ecological” landscape ecology), together with landscape ecological structural types B2 (empirical-methodical and basic landscape ecology) and C2 (theoretical-methodological and applied landscape ecology) have the bridging mutual information flow function between the core of the theory of landscape ecology (A) and the core of the practice of landscape ecology (D).

The qualitative-quantitative landscape ecological research between the theory and practice of landscape ecology should be in approximate balance. This balance can be expressed by the following equation of the types of landscape ecology:

$$A ( A_1 + A_2 ) = D ( D_1 + D_2 )$$

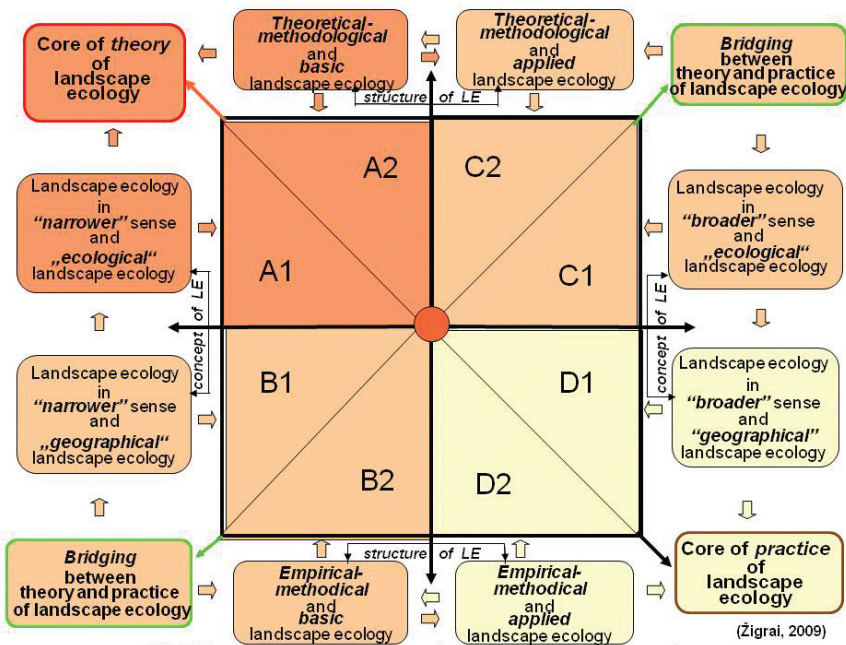


Fig. 7. Scheme of information flow between theory and practice of landscape ecology.

*Some remarks about causes of imbalance between the theory and practice of landscape ecology*

The present-day imbalance between theory (insufficient development of the landscape ecological theoretical topic) and practice of landscape ecology is very well documented for example on the most important international conference such as 7<sup>th</sup> IALE World Congress „25 years of Landscape Ecology: „Scientific Principles in Practice“ Wageningen, 8–12 July, 2007; European IALE Conference 2009 „European Landscapes in Transformation Challenges for Landscape Ecology and Management“, Salzburg, July 12 – 16, 2009 and 15<sup>th</sup> International Symposium on Problems of Landscape Ecological Research “LANDSCAPE – Theory and Practice” 29 September – 2 October 2009 Bratislava, Slovak Republic. From the large number of landscape ecological empirical-methodological basic and applied papers and posters only some contributions are related to theoretical issues of landscape ecology.

The causes of this imbalance between theory and practice of landscape ecology are of an objective and subjective nature. To *the objective causes* commercialisation of the sciences, preference of the practice related to short-time research at the expense of the theory related to long-term research, financial under-dimension of theoretical research and the multiple partial feedback information blockade between practice and theory of landscape ecology.

The *subjective causes* are first of all the difficulty in abstraction and generalization of particular empirical basic and applied landscape ecological knowledge into theoretical regularities and principles, the discrepancy between the ability of the theoretical thinking of outstanding landscape ecologists on one hand and their overload with scientific management on the other hand.

The multiple partial feedback of information blockade between the theory and practice of landscape ecology can cause a horizontal information gap between theoretical landscape ecology, theoretical geography, theoretical ecology and a vertical information gap between theoretical landscape ecology, meta-landscape ecology and methodical landscape ecology. The consequence of this partial information blockade is the reduction in horizontal and vertical flow of interdisciplinary and trans-disciplinary scientific data, what is very negative for the development of theory and practice of landscape ecology.

A similar situation occurs by partial information feedback blockade within the conceptual and structural types of landscape ecology. In the framework of conceptual types of landscape ecology, concrete between the landscape ecology in the “narrower“ sense and landscape ecology in the “broader“ sense and between “ecological“ landscape ecology and “geographical“ landscape ecology. In like manner there is negative impact of partial information feedback blockade in the framework of structural types of landscape ecology, especially between theory and empiricism of landscape ecology and basic and applied landscape ecology between “ecological“ landscape ecology and “geographical“ landscape ecology.

Partial information feedback blockade between the landscape ecology in the “narrower“ sense (orientated firstly of on the basic research of transformation of natural processes, the flow of the organism, energy and mass of landscape ecosystems and landscape structure) and landscape ecology in the “broader“ sense (orientated mostly on research of the relation-

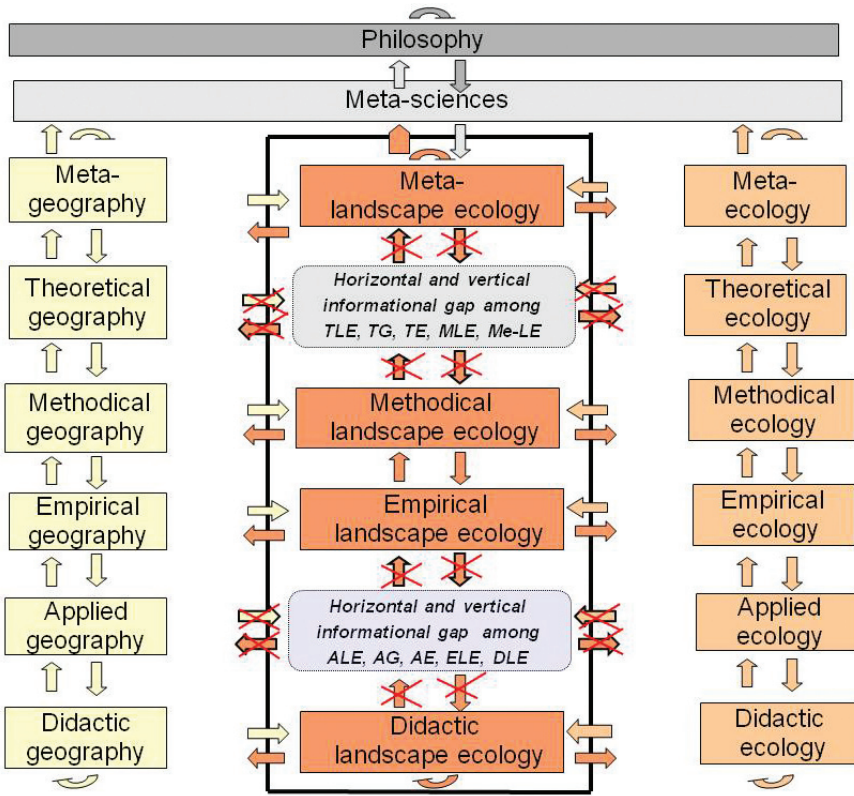


Fig. 8. Scheme of horizontal and vertical information flow among theoretical, applied landscape ecology and other sciences.

ship between nature and man in the contextual comprehension of ecological-environmental problems of landscape) causes the loss of new impulses and ideas which are necessary for the development of landscape ecology in the “narrower” sense.

Partial information feedback blockade between the “ecological” landscape ecology (landscape ecology with a predominance of elements of ecological gravitation field) and “geographical” landscape ecology (predominance of elements of geographical gravitation field) initially causes a loss of spaciousness for ecological research at the landscape scale.

Partial information feedback blockade between the theory of landscape ecology and empiricism of landscape ecology causes a decrease in new landscape ecological empirical knowledge necessary for its theoretical generalization.

In this way the effectiveness of the landscape ecological theory is also reduced. Partial information feedback blockade between basic and applied landscape ecology causes the loss of new impulses and ideas which are especially necessary for working out a new theoretical



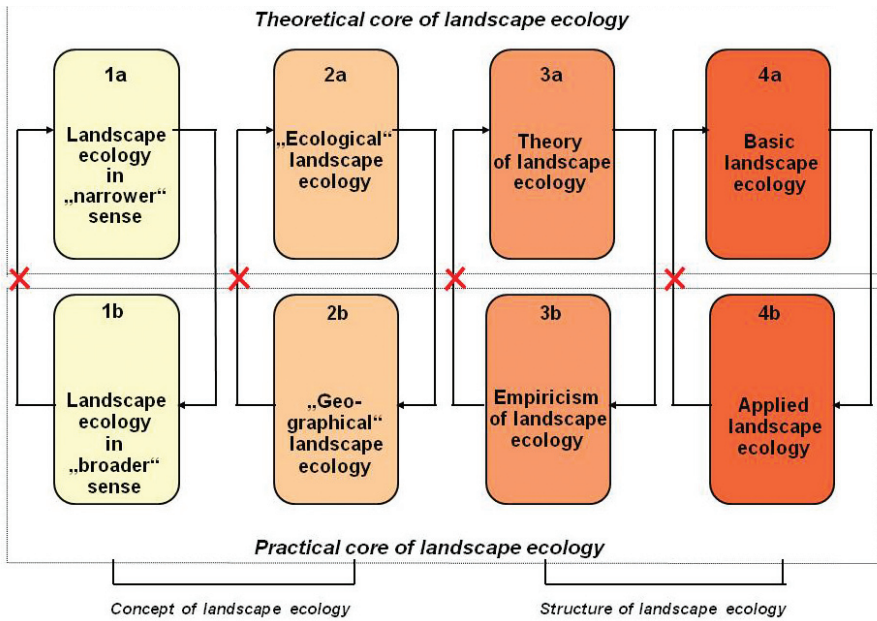


Fig. 9. Scheme of the multiple partial information feedback blockade between the theory and practice of landscape ecology.

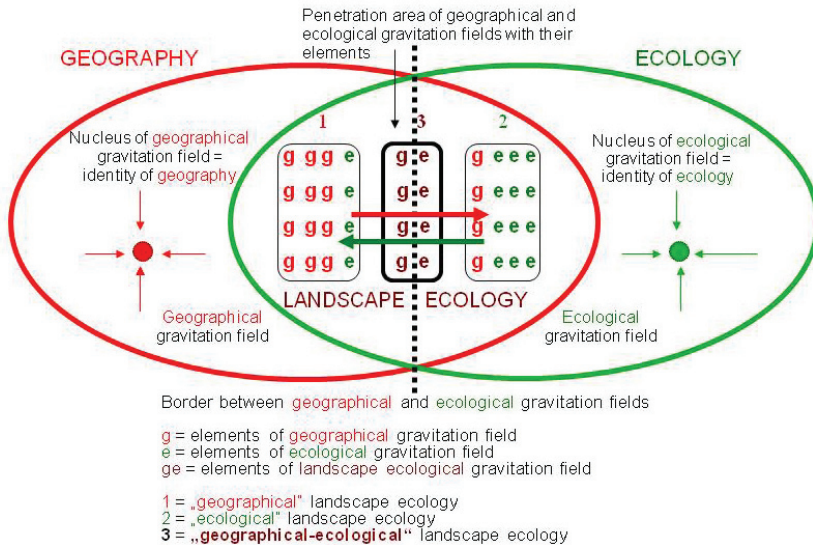


Fig. 10. Scheme of penetration of geographical and ecological gravitation fields as a basis for the meta-scientific principle of inseparability of geographical and ecological entities of landscape ecology.

basis and methodological equipment to solve the practical ecological and environmental problems.

*Some remarks about measures to obtain well-balanced relationships between theory and practice of landscape ecology*

In the framework of theoretical landscape ecological research it is important to generalize the results of the basic landscape ecological research of the landscape ecosystems with their structure and processes. These should form the new part of some main theoretical regularities and the following principles of landscape ecology e.g. the principles of landscape changes, landscape stability, biological diversity, ecological stability and also sustainable development.

Such enriched principles can be a very valuable theoretical contribution to basic and applied landscape ecological research. One of most important tasks of theoretical landscape ecology for the needs of landscape transformation research is working out the possibility of bridging various spatial scales with various processes of ecological phenomena, properties and information.

It is also very important to deepen the collaboration and exchange of scientific information first of all among the static, dynamic and restoration landscape ecology. More attention should be paid to working out time aspects and especially to the study of the effect of time properties such as time accumulation potential, time continuity and time inertia. In this way it is easier to understand the changes of landscape ecological processes and phenomena as part of landscape transformation. (Žigrai, 2001b).

In the future it will be necessary to intensify the information flow between the theory and practice of landscape ecology which will among other things contribute to the expansion of the theoretical methodological spectre of basic and applied landscape ecological research, to increase the significance of landscape ecology and its position among the nomothetic and idiographic scientific disciplines and enable increased efficiency of implementation of results reached in the basic landscape-ecological research in applied landscape ecology.

In the framework of *applied* landscape ecological research, it is important to outline a more effective mechanism of transformation, implementation and argumentation of obtained results by landscape-ecological research concerning the changed properties of ecosystems and its processes at the landscape scale for the needs of landscape transformation, landscape planning and management and also for decision makers and stakeholders.

This mechanism is based on the mutual influence between landscape ecological research and landscape development planning. The results of the landscape-ecological research form the scientific background of landscape planning and management and enrich its theoretical and methodological basis and vice versa, the results of landscape planning form the applied background of landscape-ecological research and enrich its theoretical and methodological basis.



From the above mentioned selected remarks about the importance of theory and practice in landscape ecology and the causes of imbalance between the theory and practice of landscape ecology, it is possible to outline the following most important measures:

- looking for systematic to reduce the negative impact of multiple partial feedback information blockade within the conceptual and structural types of landscape ecology, and in this way between the practice and theory of landscape ecology;
- working-out the landscape ecological theoretical and meta-scientific principles; improvement in the applied effectiveness of the theory of landscape ecology, a more effective mechanism of transformation, implementation and argumentation of obtained results from landscape-ecological research in changed properties of ecosystems;
- support of *theoretical thinking* by landscape ecology students and landscape ecologists;
- establishment of integrated blocks of theoretical papers on landscape ecological conferences and
- the establishment of a *theoretical-methodological working group* in the framework of the new European Association for Landscape Ecology (IALE – Europe).

## Conclusion

The development of a theoretical basis of landscape ecology is most important for its sustainable development and effective application in practice, because theory and practice are two inseparable and mutually dependent categories. There is to a certain degree lag in the development of landscape ecological theory to its practical application. This is a current undesirable feature of landscape ecology, and this discrepancy is caused by several objective and subjective reasons and consequences, which are shortly analysed in this contribution.

It follows that, the very important indicator to sustain the approximate balance between the theory and practice of landscape ecology, is the relationship between basic and applied landscape ecological research on the one hand and the relationship between the theory and experience on the other hand. By strengthening theoretical landscape-ecological research and by working out theoretical landscape-ecological principles it is possible to formulate regularities and principles of landscape ecology. These regularities and principles make it possible to use and accelerate the generalised results of basic empirical and applied landscape ecological research on other studied territory. In this way, the landscape ecological field research achieved can be more efficient, rapid and cheaper. Thereby, we can strengthen the nomothetical character of landscape ecology and simultaneously its position among other sciences.

The implementation of theoretical and empirical knowledge of basic landscape ecological research in-to practice currently presents a great challenge for landscape ecology. In this context, the burning question is to what extent landscape ecology is prepared, as the science with its theoretical basis, methodological infrastructure, quantitative-qualitative nature of empirical knowledge, to solve successful practical ecological and environmental issues from the landscape ecology point of view.

There are two most important conditions to preserve the sustainable development of theory and practice of landscape ecology. Firstly, to provide the qualitative and quantitative balance between development of theory and practice of landscape ecology and secondly to keep the mutual qualitative and quantitative information flow between them.

The multiple partial feedback of information blockade between theory and practice of landscape ecology can cause a horizontal information gap between theoretical landscape ecology, theoretical geography, and theoretical ecology, and a vertical information gap between theoretical landscape ecology, meta-landscape ecology and methodical landscape ecology.

Consequent to this partial information blockade is the reduction in the horizontal and vertical flow of interdisciplinary and trans-disciplinary scientific data, which has a negative impact on development of the theory and practice of landscape ecology. In the future, it will be necessary to intensify the information flow between theory and practice of landscape ecology, which will amongst other things, contribute to the expansion of the theoretical methodological spectre of basic and applied landscape ecological research. This will increase the significance of landscape ecology and its position among the nomothetic and idiographic scientific disciplines and lead to the increased efficiency in implementation of results reached in the basic landscape-ecological research in applied landscape ecology.

*Translated by the author  
English corrected by R.J. Marshall*

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