

Higher Education on Land Management and Land Administration

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Introduction

There are a lot of concepts related to *land* and sometimes it can be difficult to understand how they are used. Land can be linked with *governance, policy, management, administration, development, and planning*. Other words like public, urban, peri-urban and rural can be added. Often the word sustainable is enclosed, which can make it even more confusing. At the same time all the concepts are in a way parts of a consistent system with dependent components. Magel (2013) names it the "land sector".

This paper intends to go through those concepts and then tries to define them for the purpose of promoting land management and land administration education in Russia, especially for agriculture (life science) universities. The paper, however, makes no claim to include everything written in literature about the terminology of land related issues. Terminology is only the framework for the following education discussions. However, definitions and explanations of concepts are from different sources. To some extent, the starting points for each concept are descriptions taken from Wikipedia. It has to be noted that most of the terminology in Wikipedia concerning the land sector is marked with the following sentence: "*The examples and perspective in this article may not represent a worldwide view of the subject. Please improve this article and discuss the issue on the talk page.*"¹ This can be seen as a proof that definitions on land related issues are fuzzy. It also has to be said that it is probably people with interests in different parts of land management and land administration that are promoting their interests in the Wikipedia notes.

Definitions

Rights to Land

All land is divided into rights and someone is right holder (*Figure 1*). This aspect of land is fundamental for all concepts treated below. The land in a country can totally belong to the State (only one owner) or it can be distributed to a lot of different owners. If distributed, the owners can be the State, municipalities, the Church, companies, trusts, private people etc. We get owner (right holder), ownership right (a right) and land area. It shall be remarked that rights to land are normally more or less regulated.

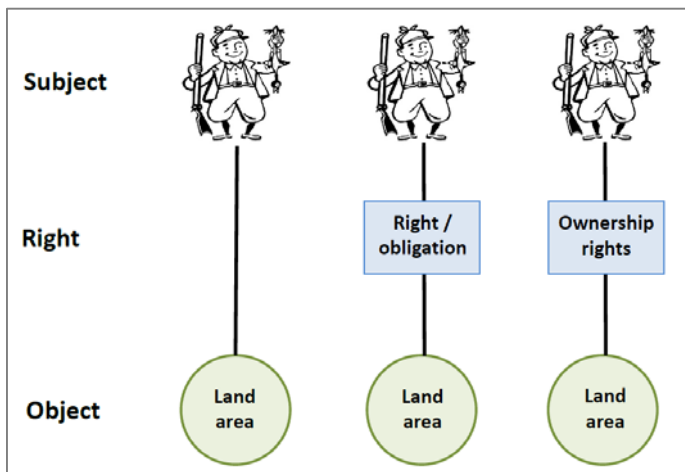


Figure 1. Legal land relations. The left relation is often called open access. All types of land rights nearly always include obligations and restrictions (Source: Mattsson, 2004)

¹ The information in Wikipedia data base can be changed all the time. That is the reason for only writing references to the Wikipedia database as (Wikipedia) in this paper without any year etc. Normally it is also quotations (all or partly) when the reference is to this database, even if it is not marked as quotations.

In a situation with a lot of owners, their rights must be delimited in space. The smallest delimited unit of land often is called property or parcel. We get real properties (real estate in American English). Within the property, the land is used in one or another way. We get land use. This land use can be traditional, permitted, illegal etc. It is a physical object that cannot be moved, but at the same time land is an abstract thing that is manifest as a set of rights – sometimes called a bundle of rights – to its use. In many countries land has a value and can be traded (Dale & McLaughlin, 1999; Zevenbergen, 2002 and Mattsson, 2003).

There are countries where ownership to land is not accepted. Land will then instead be distributed to different users under lease or other types of use rights. We get also in this situation legal distinctions with right holders, rights and land areas distributed to government, private organizations, private people, etc. as right holders.

It shall be mentioned that water areas have a lot of similarities with land. Under the water is ground (a type of land) and we have water rights and delimited areas for these rights. It is even like that in the open sea out to the end of the negotiated economic zones. In those zones, the ground under the water as well as fishing rights are normally regulated. There are, however, in reality a lack of enforced rights to deep water outside the zones and this is what can be called open access to water and land (ground).

The market can take care of a lot of land management questions as well as of needed changes in land use. But at the same time there are market failures. Market can have difficulties in supplying public goods and in handling externalities. It shall be said that there are also governmental failures as the government has limited control over market activities. It has also lack of information and can have severe problems with bureaucracy preferences. Therefore, it can be good to find a balance between market and government. For this, we use politics by creating policy and steering instruments, like law and economy, and by creating organizations for handling the complex regulating systems that are built up. Such State governance is oriented to land policy, land management, land administration, and land development.

Land policy, land management, and land administration can be seen from a static point of view. The static view is that conditions for land use shall not change, so the land users can be sure of their rights to use the land. It can also be important for the government and society in a broad sense to stop misuse of land by prioritizing current use. But also the dynamic perspective has to be considered. Today the society is changing all the time from an economic and social point of view. The consequence is that there can be a need to change land use. Such changes are called land development. Instruments like spatial planning or land use planning are needed to take care of this.

Land Governance

Governance refers to "all processes of governing, whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organization or territory and whether through laws, norms, power or language" (Wikipedia based on Bevir 2013). Governance relates to "the processes of interaction and decision-making among the actors involved in a collective problem that lead to the creation, reinforcement, or reproduction of social norms and institutions". However, there is a problem with this definition as it is nearly totally overlapping with some policy definitions. The goal for governance is perhaps easier to formulate. Good governance defines – amongst others – the ideal status of using sparse resources efficiently (UNESCAP, 2010). Such good governance is necessary to promote social, economic and environment development in a sustainable manner. It is also essential for avoiding poverty.

FIG (2009) stipulates that "Land governance is about the policies, processes and institutions by which land, property and natural resources are managed. This includes decisions on access to land, land rights, land use, and land development. Land governance is basically about determining and implementing sustainable land policies and establishing a strong relationship between people and land." FIG also mentions that sound land governance is fundamental in achieving sustainable development and that contribution of land professionals is vital.

FIG (2009) continues: "All countries have to deal with governing their land. They have to deal with the governance of land tenure, land value, land use and land development in some way or another. A country's capacity may be advanced and combine all the activities in one conceptual framework supported by sophisticated ICT models or, more likely, capacity will be involved in very fragmented and basically analogue approaches".²

² Information, Communication, Technology models

FAO has written guidelines about governance of tenure to get principles of standards for use and control of land, fisheries and forests with the aim to support improvement of policy, legal and organizational frameworks that regulate tenure rights. But the publication has not clearly defined what it means with governance. It is only said indirectly as "governance of tenure is a crucial element in determining if and how people, communities and others are able to acquire rights, and associated duties, to use and control land, fisheries and forests" (FAO, 2012). The guidelines also mention that there are different models and systems of governance of natural resources under national contexts, without mentioning such models and systems.

Actually, under the content of the concept governance of the land sector, as referred to above, we can find more or less everything that land policy, land management and land administration are dealing with. To clarify the differences and relations between these three concepts is complicated as many authors and organizations have different definitions.

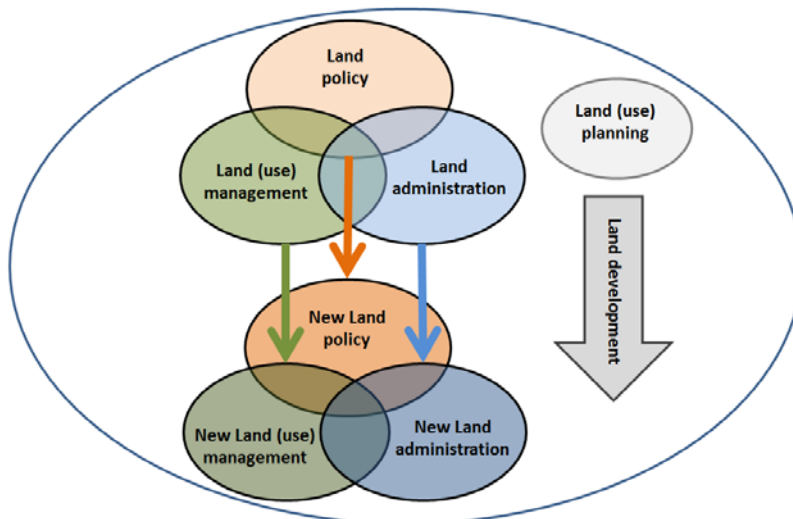


Figure 2. Land governance system. Land development is related to changes of land policy, land management and/or land administration. The influence from the system's environment is not shown.

Figure 2 is showing a land governance system with interconnection between its three components, namely *land policy*, *land management*, and *land administration*. The dynamic part related to changes of one or more of those three interconnected components is *land development*. The consequence of *land development* are new conditions for *land policy*, *land management* and *land administration*. To handle the whole system in a good way, land governance is needed. Each component in Figure 2 will be explained and also be defined in the following chapters. As said before, the following definitions does not aspire to be the only relevant definitions covering everything. Their function is to support later discussions about curricula development for land management and land administration.

Land governance is defined in this paper as government's complex task to guide, overlook and steer the land sector.

Land Policy

A *policy* can be seen as a principle to guide decisions and achieve rational outcomes. It is a statement of intent, and is implemented as a procedure. The term *policy* may apply to government, private sector organizations, groups, and individuals. *Public policy* can then be seen as an administrative guide to actions taken by the State's executive branches. Some define it as a system of courses of action, regulatory measures, laws, and funding priorities concerning a given topic promulgated by a governmental entity or its representatives (Wikipedia).

In accordance with this, land policy is guiding the use of land in a broad sense. This is expressed quite clear in the document "EU Land Policy Guidelines" (EU, 2004), where it is said that "land policy aims to achieve certain objectives relating to the security and distribution of land rights, land use and land management, and access to land, including the forms of tenure under which it is held. It defines the principles and rules governing property rights over land and the natural resources it bears as well as the legal methods of access and use, and validation and transfer of these rights. It details the conditions under which land use and development can take place, its administration, i.e. how the rules and procedures are defined and put into practice, the means by

which these rights are ratified and administered, and how information about land holdings is managed. It also specifies the structures in charge of implementing legislation, land management and arbitration of conflicts."

With this definition land policy can deal with all guiding principles for land use that are important for rational outcomes. It can be applied to prevent changed land use as well as to promote changes. Land policy requires different approaches depending on case to develop measures and activities, which can be implemented by land managers. Guiding principles can be public as well as private. Public authorities can use compulsory tools for implementation, whereas private managers have to act within the legal framework of land rights and regulations.

Land policy is in this paper defined as the guiding principles for land use.

Land Management

Land management is the process of managing the use and development (in both urban and rural settings) of land resources (Wikipedia). UN-Habitat (2010) expresses it in the following way. "Land management is about putting land resources into efficient use for producing food, providing shelter and other forms of real estate or preserving valuable resources for environmental or cultural reasons. In order to manage land properly, land professionals have developed policies and tools to implement policies. This includes urban planning, land readjustment, land taxation, land administration, and management of public spaces. It is thus concerned with making informed decisions on the allocation, use and development related to natural and built resources." The problem with this approach is that it totally or partly includes policy, management, administration, and development concepts.

Today we also discuss sustainable land management, which is often based on the "Rio declaration on environment and development" (UN, 1992). In short, it declares that sustainable development shall be based on economic, social and environmental demands and those demands shall be balanced in a long term perspective (often referred to as the three pillars of sustainability). Those acts of balancing in principle shall affect all activities like agriculture, forestry, water use, urban expansion, construction and property management. Actually, the goal is that sustainability shall be applied to land policy, land management, and land development.

In our understanding the term land management includes cultivation and use of land (e.g. for agriculture, forestry, natural resources, and urban purposes). That is why we use the concept "land use management" to make it more precise and to avoid misinterpretations.

Land use management is in this paper defined as work related to use of land resources within current policy guidelines taking into consideration the legal framework for a specific land area.

Land Administration

According to the United Nations the definition of good governance in the field of land administration includes an existing formal system for the registration of land and property rights. Such a system has to secure the ownership of land, the investments and other private and public interests in real estate (UN, 2005). There is also a need to map the land units and with it the boundaries of rights. Sometimes also the valuation of land / rights is required.

UN/ECE (1996) defines land administration as "the process of determining, processing and disseminating information regarding the ownership, value and use of land, when implementing land management". FIG (2009) has the same approach. It says "Effective systems for recording various kind of land tenure, assessing land values and controlling the use of land are the foundation of efficient land markets and sustainable and productive management of land resources. Such systems should be based on an overall land policy framework and supported by comprehensive land information and positioning infrastructures". Land administration can be seen as public sector activities required to support the alienation, development, use, valuation and transfer of land (Dale & McLaughlin, 1999).

The importance of land administration is farther stressed in the Bathurst Declaration on Land Management for Sustainable Development (FIG, 1999). It points to the need of land administration institutions in the meaning of "rules of the game". This includes laws and regulations necessary for creating property rights, for registering and subsequently transferring them, for resolving disputes, for taxation purposes, and the equitable resumption of these rights. There must be a sufficiently robust infrastructure to, amongst other things, effectively

supporting the goal of enhancing security and access to credit, while at the same time being sufficiently simple and efficient so as to promote and sustain widespread participation.

UN/ECE and FIG definitions seem to be more or less static if they are applied. They focus on providing information about land. Some make, however, the definition of land administration more dynamic like Dale & McLaughlin (1999) and Williamson et al. (2009). They look at land administration as an instrument for implementing and monitoring specific land policies. Williamson et al. also include changes of land rights in a broad sense, and even development.

At Wikipedia we can also find this dynamic view of land administration. It is written that land administration is the way in which the rules of land tenure are applied and made operational. Land administration, whether formal or informal, comprises an extensive range of systems and processes to administer. The processes of land administration include

- the transfer of rights in land from one party to another through sale, lease, loan, gift and inheritance;
- the regulating of land and property development; the use and conservation of the land;
- the gathering of revenues from the land through sales, leasing, and taxation; and
- the resolving of conflicts concerning the ownership and the use of land.

Land administration functions may be divided into four components: Juridical, regulatory, fiscal, and information management. These functions of land administration may be organized in terms of agencies responsible for surveying and mapping, for land registration, and for land valuation. (Wikipedia).

Perhaps it would be good to go back to the ancient Latin word “Ad ministrere”. Its meaning is “to serve for something” (Stowasser, 1938). This would include also all activities concerning the documentation of land use rights as well as to control and monitor that the people follow the rules.

Land administration in this paper is defined as the legal rules for land use related to a certain area. As information (site, value, etc.) about such area is essential, the tools for assessing, documenting and mapping this information are parts of land administration.

Land Development

A conclusion from our discussions about land administration is that we need methods to regulate ownership and other rights to land. Such other types of rights can be easements, leases, and mortgages. We need permitted land use and information how the land belonging to a right holder is formed in space (on the surface, but also considering the vertical dimension) and/or in time. The right holders ought to be secure in their rights and they must dare to invest. Nevertheless, we also need methods for changing following three aspects of land: right holders, land use rights, and land areas. We need stabilizing and dynamic approaches to all three aspects. The stabilizing factors promote investments and the dynamic factors promote changes (*Figure 3*).

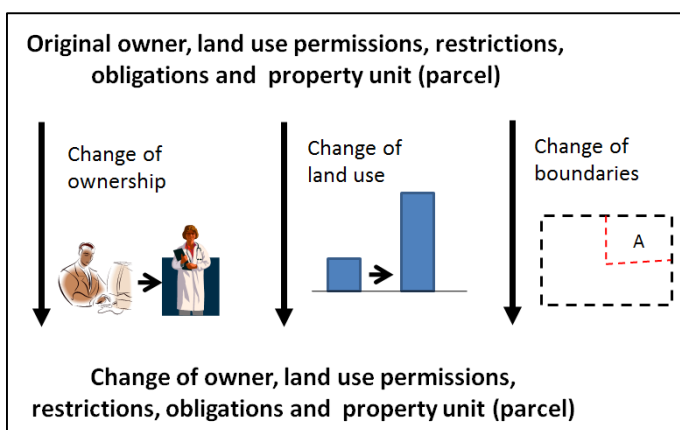


Figure 3. Need of dynamism in land law. Source: Based on Mattsson 1997.

Land development is the dynamic factor in the land sector including executive components. This can include the change of land rights and the implementation of activities needed for the new land use. One example could be a change from agriculture to housing. Actually, preservation like creation of national parks, nature reserves and cultural heritage areas can also be seen as land development as it can be assumed that it is a change to a better use. At least two types of land development can be observed. One is to develop land within current

(existing) land rights and permitted use (e.g. change of crop rotation, permitted construction). The other type is the changes of land rights. The first is a kind of land (use) management, the second a kind of land administration and a prerequisite for new land use management.

Land development is in this paper defined as the bundle of methods to change land use including land rights. To bring about changes, there can be a need to minor and/or radical changes in land policy, land use management and/or land administration.

Planning / Land Use Planning

One important tool for land development is planning, especially *land use planning*. Planning (also called forethought) is the process of thinking about and organizing the activities required to achieve a desired goal. Planning involves the creation and maintenance of a plan. It combines forecasting of developments with the preparation of scenarios of how to react to them. An important, albeit often ignored aspect of planning, is the relationship it holds with forecasting. Forecasting can be described as predicting what the future will look like, whereas planning predicts what the future should look like. It helps with coping with complexities. The counterpart to planning is spontaneous order. (Wikipedia)

Planning is a way for national and local governments to regulate land use and development in an efficient way in accordance to land policy. Land use planning can prevent land conflicts but also create such conflicts. Planning without implementation tools is, however, in principle often wasted time. So land use management and land development need both planning and implementations tools to be efficient. It shall be observed that one part of land policy is to develop such tools. One of the strongest implementation tools is to make planning results legally binding for land users.

Land use planning can be divided into three main types: urban, peri-urban and rural. Of course, there are a lot of "subtypes" of these planning types.

Urban planning (urban, city, and town planning) is a technical and political process concerned with the use of land and design of the urban environment, including transportation networks, to guide and ensure the orderly development of urban areas. It concerns itself with research and analysis, strategic thinking, architecture, urban design, public consultation, policy recommendations, implementation and management. A plan can take a variety of forms including strategic plans, comprehensive plans, renewal plans, neighbourhood plans, regulatory and incentive strategies, or historic preservation plans. (Wikipedia)

Peri-urban areas are defined by the structure resulting from the process of peri-urbanisation. It can be described as the landscape interface between town and country or also as the rural-urban transition zone, where urban and rural uses mix and often clash. It can thus be viewed as a landscape type in its own right, one forged from an interaction of urban and rural land use (Wikipedia). Here we can talk about *peri-urban planning*.

In general *rural* areas are geographic areas outside urban areas. Some main land uses are agriculture, forestry, pastoralism and pastoral farming, water use and nature conservation. A lot of infrastructure is also located to rural areas like water and nuclear power plants with power lines, roads, railways, and rivers for shipping. Mines can also have great impact on land use. To handle and promote all those activities and also to avoid conflicts between the different users, *rural planning* and implementation tools are needed.

Land use planning is in this paper defined as the process to predict future land use.

Development of education programs for land professionals

The development of education programs for rural land professionals will be a wide task as so many fields of knowledge must be included. Educational programs for rural land professionals have to include theoretical knowledge as well as practical competences and experiences related to the following definitions (taken from above):

- i. *Land governance* is government's complex task to guide, overlook and steer the land sector.
- ii. *Land policy* is the guiding principles for land use.
- iii. *Land use management* is work related to use of land resources within current policy guidelines taking into consideration the legal framework for a specific land area.
- iv. *Land administration* is the legal rules for land use related to a certain area. As information (site, value, etc.) about such area is essential, the tools for assessing, documenting and mapping this information are parts of land administration.

- v. *Land development* is the bundle of methods to change land use including land rights. To bring about changes, there can be a need to minor and/or radical changes in land policy, land use management and/or land administration.
- vi. *Planning* is the process to predict future land use.

In the discussions above it is clear that it is not possible to define land policy, land use management, land administration, and land development in such a way that they are strictly separated. The boundaries between the definitions are fuzzy. Each of them has some unique functions, but in general they are interconnected and also partly overlapping (*Figure 2*). If a new university program has to be developed, it has to be decided how to look at the concepts and how to find the most rational realisation.

However, it seems to be impossible to develop one unique program for all mentioned land related tasks. In such a case, some different approaches must be chosen from strategic point of view. This can be based on professional needs in the university regions and/or what the main competences of the university are. The requirements can be based on traditional experience, but it is necessary to take up new demands for knowledge. Students should also get the possibilities to take over functions from other professional groups that are not quick enough to respond the changed needs of the society. That creates a demand on the university to improve and to change current study programs, to add new courses, and to cancel courses that are not needed any longer or where there is decreased demand on knowledge.

A university cannot deliver all needed subjects for a society that is under quick economic development. Therefore, specific knowledge required by an individual employer has instead to be provided by the company or the authority.

As mentioned above it is not possible to cover all tasks of the land sector in one program. However, during the design process of an academic study program it is good to start with a general structure (*Figure 4*).

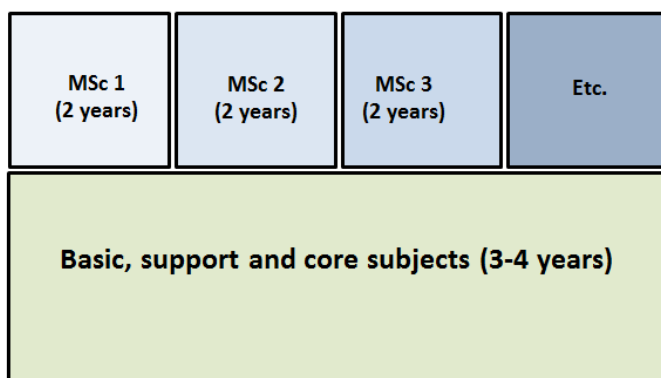


Figure 4. Basic model for Land professionals education (three / four + two years)

The study concept has a common base with what can be called *basic, support* and *core* subjects. The meaning of basic subjects is subjects that shall support understanding of other subjects. Mathematics, natural sciences, ecology as well as basic law and economy can be examples. Support subjects are subjects that improve the understanding of the professional role in relation to other professions. The knowledge in those subjects does not need to be so deep. Core subjects are related to the future professional work. Such common base can be good to have for a BSc program related to land use management and land administration. However, it can be assumed that it is not possible to have everything in one BSc program. Instead, at least two have to be developed. The reason is that land use management and land administration are so different in their basic need of competence.

The MSc level is traditionally a scientific degree, but it can also be seen as an advanced professional qualification after the BSc level. Deeper knowledge can be given by one or several specific MSc programs, which the students can choose according to their interests. The MSc programs can include different subjects, whereas some contents can be delivered for several MSc programs.

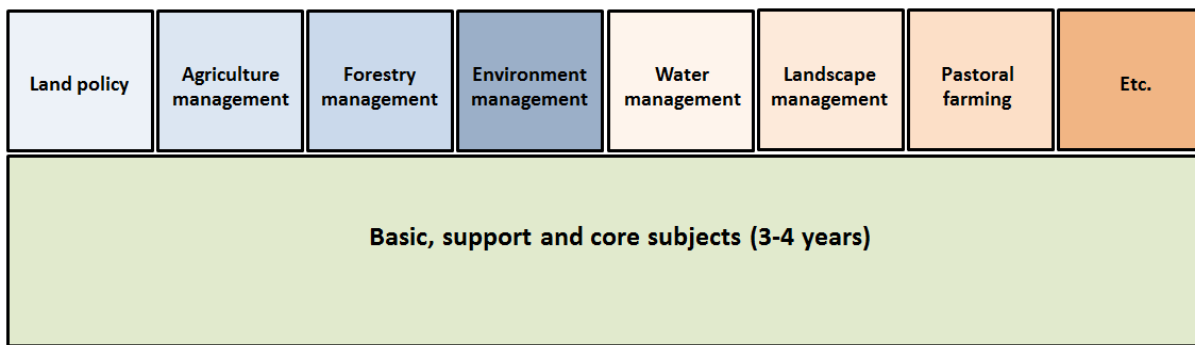


Figure 5. Potential model for Land Use Management education. The duration for the basic education may vary between three and four years.

Models for land use management and land administration are shown in *Figure 5* and *Figure 6*. If this approach is accepted, the next task is to develop structures of subjects within each BSc and MSc program.

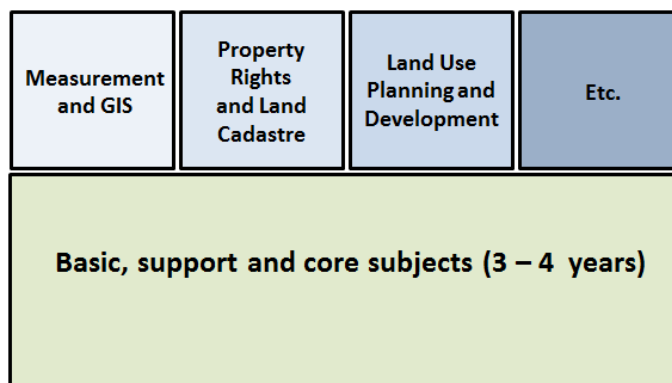


Figure 6. Potential model for Land Administration education including planning and legal aspects of land development.

This paper highlights the importance of land rights based on the assumption that it is the land right holder’s responsibility to take care of the land. Land governance, land policy, land use management, land administration, and land development are used as different ways to support and sometimes to punish the right holders in such a way that we get an efficient land use from public point of view. Independent of profile of BSc and MSc programs, the students must understand the whole land sector issues. Therefore, a basic module about interconnection between all mentioned land related topics is necessary for all students.

As mentioned, land policy, land use management, land administration, and land development covers a static point of view as well as dynamic aspects of land. To make students aware of static and dynamic aspects, the different programs have to cover both perspectives.

Land use planning and development can be included in both types of curricula (*Figure 5* and *Figure 6*). The difference is that land development under land use management is related to development within current property regime, while land use planning and development within the land administration is related to needed changes of property rights to permit a new approach of land use management.

Planning for changes ought to be both in land use management programs and in land administration programs. Some changes need changes in property rights. Such land development demands deep knowledge in land law and property valuation. This is the reason why property related education is connected with land administration education and has to be part of land administration programs.

The task of the current article is to give a basic document for developing education in land use management and land administration. This means that land governance and land policy will not be further considered as a specific study program. However, curricula of land use management and land administration have to cover basic knowledge on land governance and land policy.

Land use management approach

Land use management programs can be focused to activities related to efficient *land use* within current or future properties. Cultivation of land, primary production of food and the construction of facilities are – in our understanding - parts in this type of study courses.

Study programs of land (use) management are not considered in the TEMPUS project "ELFRUS". Therefore, only some Austrian examples of land use management programs at BOKU are listed without outlining the contents.

Land Use Management - Bachelor Programs

- Agricultural Sciences (180 ECTS):
University of Natural Resources and Life Sciences, BOKU Vienna – Austria
- Forestry (180 ECTS)
University of Natural Resources and Life Sciences, BOKU Vienna – Austria
- Environment and Bio-Resource Management (180 ECTS)
University of Natural Resources and Life Sciences, BOKU Vienna – Austria
- Landscape Architecture and Landscape Planning (180 ECTS)
University of Natural Resources and Life Sciences, BOKU Vienna – Austria

Land Use Management - Master Programs

- Agricultural and Food Economy (120 ECTS)
University of Natural Resources and Life Sciences, BOKU Vienna – Austria
- Forest Sciences (120 ECTS)
University of Natural Resources and Life Sciences, BOKU Vienna – Austria
- Environment and Bio-Resource Management (120 ECTS)
University of Natural Resources and Life Sciences, BOKU Vienna – Austria
- Landscape Architecture and Landscape Planning (120 ECTS)
University of Natural Resources and Life Sciences, BOKU Vienna – Austria

Land administration approaches

Land administration programs shall be focused on how to measure, to register and how to change land rights. As mentioned above, land can be a physical or an abstract thing (Dale & McLaughlin, 1999). The physical term describes mainly the technical and natural scientific characteristics of an administrative land unit, whereas the abstract term subsumes all legal aspects of the territory within defined boundaries. Physical as well as abstract characteristics can change within time.

The consequence of this is a basic need of mathematics, measurement techniques, land law, land use planning, and real estate valuation in the BSc programme. After this, focus on physical, legal and planning issues can be given in specific MSc programs (see *Figure 7*). The profiles in the figure are based on investigations by Allan (1996), Mattsson (2001 and 2004), Mansberger & Steinkellner (2007). To demonstrate further differences, also a pure technical geodesy program as well as a typical land use management program are included in *Figure 7* (indicated with grey dots).

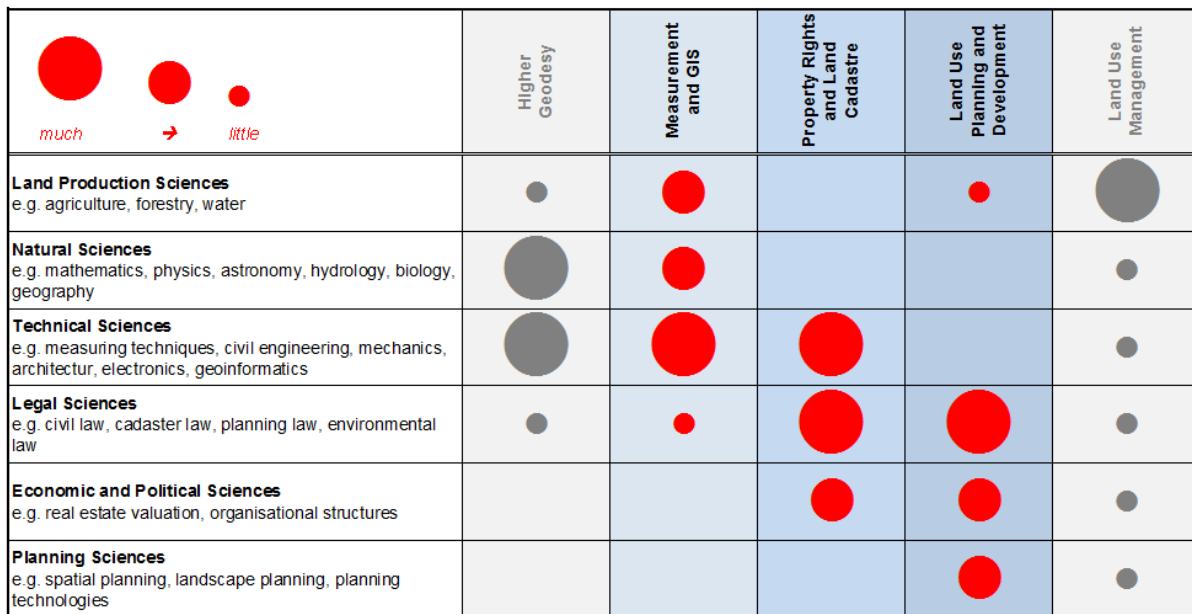


Figure 7. Competences of specific Land Administration MSc study programs in comparison to study courses on Higher Geodesy and Land Use Management (those compared study programs are marked with grey dots).

Measurement and GIS

The physical documentation of land includes the shape, the size and the coverage of land administration units. The assessment of these characteristics can be done by land surveying techniques, by means of photogrammetry or by using methods of remotes sensing.

Within the last decades cadastres were digitized. Cadastral data are available in data bases and are delivered to customers via internet. Information and communication technologies are required as new skills in land administration. Additionally, digital cadastral maps enable the link to other countrywide existing geodatabases. As data sets are available in different coordinate systems and with different accuracies, fundamental knowledge on reference- and projection systems has become increasingly important.

The provision of detailed, homogeneous, complete, verifiable, timely and easily accessible information on land is an ongoing challenge for land administration. Academic education has to integrate newly developed and improved methods of extraction, processing, storage and distribution of spatial data about land to the study programs.

Main focus in the education is given to the assessment of geodata. Competences and experiences on measuring techniques and methods for the acquisition of geometric information as well as thematic information has to be gained in this study course. Basic knowledge in geodesy is required to understand GNSS methods (Global Navigation Satellite Systems). Monitoring of land cover and land use are new tasks in land administration. Remote Sensing and image analysis methods enable a largely automated assessment of land cover and land use changes.

The gain of knowledge about state-of-the-art GIS methods is part of the training in study programs on *Measurement and GIS*. Topics like databases, data representation, spatial analysis, and visualizations of geodata have to be integrated to the curricula. Experiences on Web-GIS-technologies have to be gained.

For understanding the role for land sector, basic knowledge on land use and legal issues have to complete the study programs.

Property Rights and Land Cadastre

"A cadastre is normally a parcel-based system, ie. information is geographically referenced to unique, well-defined units of land. These units are defined by the formal or informal boundaries marking the extent of lands held for exclusive use by individuals and specific groups of individuals (e.g. families, corporations, and communal groups). Each parcel is given a unique code or parcel identifier. Examples of these codes include addresses, co-ordinates, or lot numbers shown on a survey plan or map" (FIG, 1995).

A cadastre can be designed to support property and credit markets as well as for property taxation. The information of the cadastre can also be important for rural, urban and infrastructure planning, for land management and for environment monitoring. The cadastre can guarantee ownership and tenure and it is an essential tool to reduce land disputes.

A modern property register (cadastre) shall be up-to-date and ought to include information of owners, mortgages and other interests in land, regulations and obligations of land use and shape of parcels. A multi-register includes even more. To collect all this information, it is important to have organizations doing the work. Cadastre measurement is normally fundamental.

For the classical cadastre, tax assessment was the main function and also today registration of property values can be essential. Land value is a changing variable and it is actually not so easy to have reliable information in a register. Value changes with market conditions, sometimes quickly. Property bubbles are a good example. Furthermore, the value is also dependent on the factors referred to in the three arrows in *Figure 3*. Different owners can invest more or less in a property and that affects the value. Legislation can also give different owners different rights for use of the property. Limited rights in the property as well as benefiting rights, e.g. affirmative easements affect the ownership of land. Current land use and permitted land use are also important for creation of value. Another factor influencing the value is the property size and where it is located. Therefore, if the value of a property is put in a register, it is in reality not reliable, but can still be useful for taxation purposes. It can also be used for roughly deciding the credit value of a property, so banks do not need to make a valuation every time someone ask for a loan with a property as security.

For cadastre education, measurement sciences and legal sciences are fundamental subjects. Valuation can also be essential.

Land Use Planning and Development

The way to look at land administration from a dynamic perspective (changes of rights) was shown in *Figure 3*. The figure shows three types of basic changes related to land rights. Those are changes in ownership, in land use, and in boundaries. All such changes can be more or less regulated by legislation combined with land policies. The wish to make changes is related to land use management in the sense that new conditions for land use shall improve the situation.

To handle the change of land rights very good knowledge in civil, cadastre, planning and environmental law is required. In addition, there is a need on planning competence. One task of the professionals educated in this specific MSc programme is to increase the land values. That is why knowledge in real estate evaluation has to be provided. Basics on land use practices completes the learning outcomes.

Changes of land rights are necessary e.g. for land consolidation procedures as well as for gaining land for roads and oil pipelines to be constructed. Another good example for applying right changes is the expropriation for public infrastructure projects. Ownership has to be changed for new land use and the expropriated area has to be delimited. The knowledge about property value is required. Compensation shall be paid to the land owners and land users. A specific challenge is the transition of land use from rural to urban in peri-urban areas. To handle all those complicated cases, good knowledge in land rights and how to change those rights is needed.

European Examples of Study Programs in Land Administration

For gaining detailed knowledge about study programs on the topic of land administration, in total 53 curricula from 19 European countries were analysed. *Figure 8* documents the distribution of land related and investigated Bachelor study courses in 11 European countries.

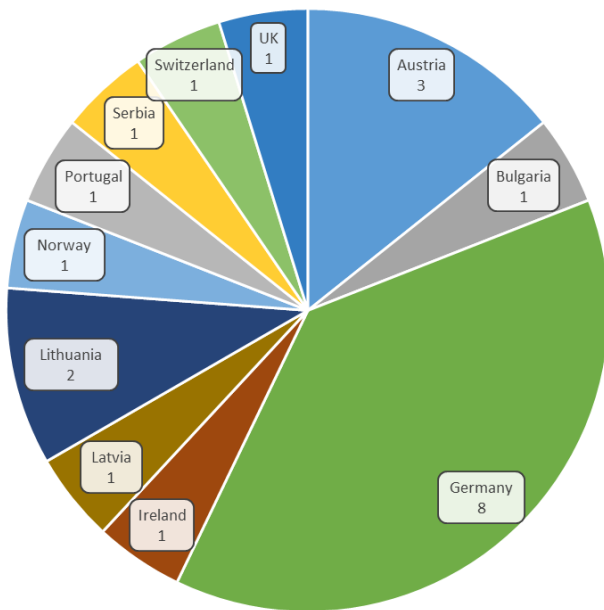


Figure 8. Number of investigated BSc Courses per country

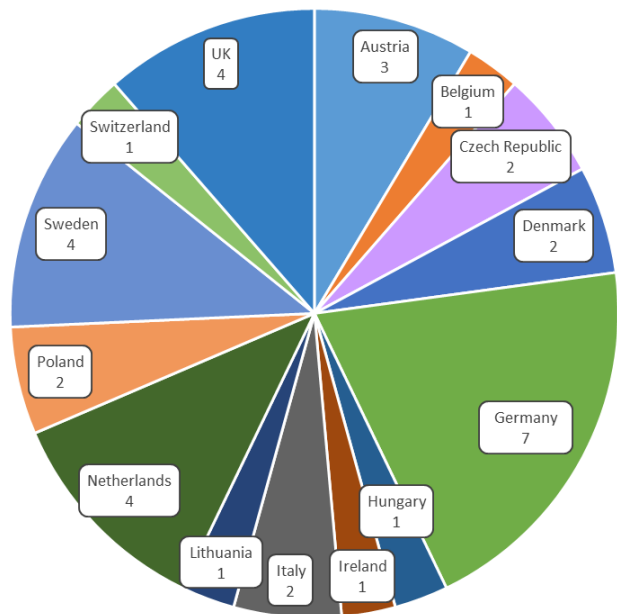


Figure 9. Number of investigated MSc Courses per country

In a first stage, six main competences were defined. All the lectures of in total 21 BSc programs were analysed according to the main subjects (as outlined in *Figure 7*). The classification of the specific study programs was done by an internet research, based on the title of the lectures – and if available – on the contents and/or learning outcomes of lectures.

The scopes of the main subjects were quantified by the ECTS (European Credit Transfer System) of the bachelor programs. It can be said that all investigated BSc programs cover the main subjects in a similar way with the following figures:

- Technical Sciences (in average 55%),
- Natural Sciences (20%),
- Planning Sciences (10%),
- Land Production Sciences (5%),
- Legal Sciences (5%), and
- Land Production Sciences (5%).

Additionally, a more specific diversification between the different main subjects could be observed in the MSc curricula. 35 master courses were investigated. *Figure 9* shows the distribution of the investigated land-related Master study programs of 14 European countries. For each of the course programs (e.g. Geodesy, Geoinformatics, Surveying and Mapping, Land Use Planning, Environmental Engineering, Real Estate Management) the study contents (lectures) were analysed and assigned to the main subjects. The results of this analysis proves the main competences of the specific land administration study courses as outlined in *Figure 6*.

Additional to the general investigations, a more detailed analysis on the specific contents of lectures (according to the descriptions and learning outcomes of lectures) was conducted for the following five master course programs:

- *Geodesy* provided by the University of Technology (TUW), Vienna/Austria;
- *Surveying and Geoinformation* provided by the University of Technology (TUM), Munich/Germany;
- *Land Management (Cadastre)* provided by the Aalborg University (AU), Aalborg/Denmark
- *Land Use and Development* provided by the Royal Institute of Technology (KTH), Stockholm, Sweden;
- *Environmental Engineering* provided by the University of Natural Resources and Life Sciences (BOKU), Vienna/Austria;

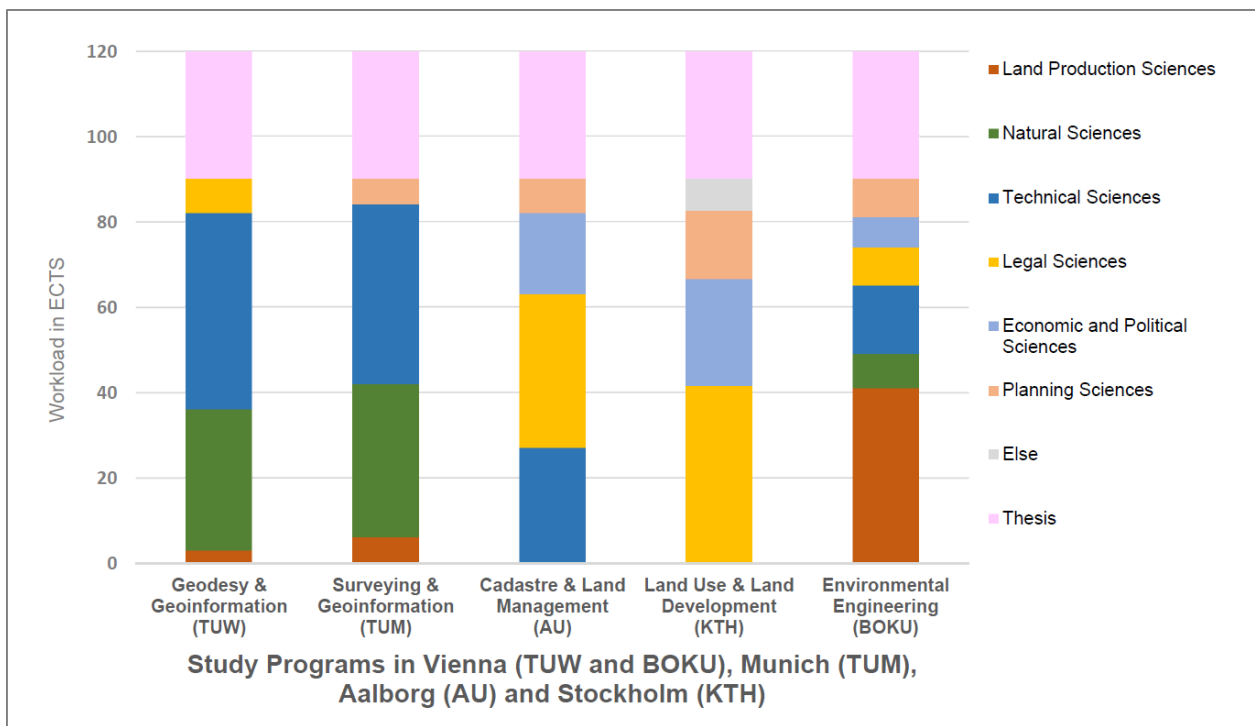


Figure 10. MSc programs with specific focus on land-related issues where each program is an exponent of the study programs outlined in Figure 7. Sources: Curricula descriptions at homepages of specific universities

The above presented land related study programs cover a spectrum from *Geodesy* to *Environmental Engineering*. Or, to put in the words of the former president of FIG, the curricula reaches ‘*from measurement to management*’ (Enemark, 2009). It shall be mentioned that almost all study programs include compulsory and elective courses. The results documented in Figure 10 are based on a choice of elective courses, which are related to the specific program objective.

It is obvious that the individual master programs are characterised by specific contents. Lectures in the measuring-orientated study courses are focused to technical sciences and natural sciences, whereas the management-orientated curricula are dominated by legal sciences and land production sciences. The MSc program on *Cadaster & Land Management* lies between these two groups and therefore, the curriculum manifests a balance between all scientific competences.

The authors of this article characterised the scientific priorities based on titles and documented learning outcomes of lectures. Due to the lack of detailed contents of lectures and due to the subjectivity of interpretation, the above documented results are fraught with uncertainties. Nevertheless, the outlined trends can be considered significant.

Summary and Outlook

The current paper outlines an approach for the development of land administration study programmes in relation to land use management programmes. As a starting point definitions of different concepts in the land sector are given. Those concepts are land governance, land policy, land management, land administration, land development, and land use planning.

Land use management and land administration are separated as different study programs. In addition, a more detailed proposal of study programs for land administration is given. This proposal is based on the Bologna architecture of Higher Education with a three to four years bachelor course and a two years master programme. According to the proposal, the study program shall consist of a common bachelor programme in land administration and after that a specification is done in three different MSc programs: Measurement and GIS, Property Rights and Land Cadastre, and Land Use Planning and Development.

An education system has to provide qualifications that are clearly defined and measurable for evaluating the achieved results. Therefore, every university has to develop and implement a qualification framework. In general, qualifications can be described in terms of workload, of learning outcomes, of competences, and/or of professional profiles.

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