Selected elements of forestry education at university level in a global context

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ARTICLE

Abstract

Based on the analysis of the results of data from national and international sources and analysis of issues indirectly related to forestry education at university level, it was found that all of the currently used evaluation methodologies relating to the ranking of universities are based on criteria focusing on research performance to a larger extent than teaching performance.

Database of university education in forestry on a global scale is no longer updated and is not verified, contains many errors and omissions and in many cases cannot be treated as a fully reliable source of information.

However, it is possible to identify certain selected items that are specific to forestry education at the university level on a global scale. In addition, forestry education is being developed at the university level, which involves educational programs for the graduates and forest administration. One of the distinguishing features of forestry education at the university level on a global scale is relatively large consensus on the areas of knowledge that a graduate should acquire. In most curricula, the key idea is the need for a holistic approach to forest management education which should express reference not only to global issues but perhaps regional and local circumstances above all.

Key words: forest education, forest sciences, universities,

Streszczenie

Dane o uniwersyteckim kształceniu w zakresie leśnictwa w skali globalnej są niezwykle trudne do porównania bezpośredniego. Baza danych o Uniwersytetach świata od dłuższego czasu nie aktualizowana i nie weryfikowana, zawiera wiele błędów i pominięć, w wielu przypadkach nie może być traktowana jako w pełni wiarygodne źródło informacji. Przyjmuje się, że jednym z najbardziej miarodajnych źródeł informacji o Uniwersytetach świata są opracowania Global university rankings and their impact (2011), w którym stwierdza się, że obecnie na świecie działa ponad 16 000 uniwersytetów. Trudności w uzyskaniu aktualnych danych statystycznych, dotyczących uniwersytetów i wydziałów leśnych w skali globalnej nie rozwiązują publikowane informacje na stronach internetowych. Dodatkowymi trudnościami w zdobywaniu danych globalnych w zakresie edukacji leśnej na poziomie uniwersyteckim są istotne luki w bazach danych, zarówno w statystykach krajowych, jak i międzynarodowych.

Możliwa jest jednak identyfikacja niektórych wybranych elementów charakteryzujących leśną edukację na poziomie uniwersyteckim w ujęciu globalnym. Zbiór materiałów do badań oparto na dostępnych publikacjach znajdujących się w zasobach bibliotecznych zarówno międzynarodowych instytucji, jak też na opracowaniach krajowych, odnoszących się do ściśle określonego obszaru krajów świata. Wykorzystano przy tym wyniki badań, które zawierały analizy zagadnień pośrednio postawionych też w szerszym widzeniu problemów nauczania leśnictwa i badań leśnych.

W wielu raportach, zarówno FAO, jak i opracowaniach regionalnych, znajdują się obszerne, głęboko przemyślane wyniki analiz, które wnoszą nowe spojrzenie i umożliwiają pośrednio dokonanie oceny jakości kształcenia w zakresie leśnictwa. Uwagę należy zwrócić na cenne opracowanie dotyczące leśnej edukacji uniwersyteckiej w Rosji oraz wyniki międzynarodowych kongresów i seminariów, ze szczególnym podkreśleniem dorobku Kongresów Światowych Leśnictwa i Kongresów IUFRO.

Przyjmując klasyfikację Thomson Reuters, Report of Findings 2011, która odnosi się do ponad 4000 uniwersytetów na świecie, ranking uniwersytetów wskazuje na wyraźną dominację poziomu nauczania w kilku państw świata nad pozostałymi. Zaznaczyć należy, że klasyfikacja ta odnosi się jedynie do oceny uniwersytetu jako całości, a nie do poszczególnych wydziałów.

Oprócz edukacji uniwersyteckiej w zakresie nauk leśnych mamy także do czynienia z intensywnie rozwijanymi działaniami wspomagającymi i poszerzającymi wiedzę leśną wśród studentów oraz absolwentów uniwersyteckich studiów leśnych. Dotyczy to zarówno programów nauczania na poziomie magisterskim, jak i specjalnych kursów aktualizujących wiedzę leśną.

Jednym z wyróżników edukacji leśnej na poziomie uniwersyteckim w skali globalnej jest stosunkowo duża zgodność co do zakresów wiedzy, którą absolwent takich studiów powinien posiadać. W większości programów nauczania myślą przewodnia jest, że konieczna jest próba holistycznego spojrzenia na edukacje leśną, która powinna zawierać nie tylko globalne, ale może przede wszystkim - regionalne i lokalne odniesienia.

Problemy w procesie edukacyjnym, odnoszące się do uwarunkowań regionalnych, muszą uwzględniać w programach nauczania zarówno przyrodniczą zmienność lasów we wszystkich strefach klimatycznych, jak i występujące różnice społeczne i kulturowe.

Także jednym z charakterystycznych elementów edukacji na poziomie uniwersyteckim w ujęciu globalnym są prowadzone próby oceny i pomiarów poziomu nauczania, jakości nauczania i benchmarkingu, które są stosowane w wielu krajach świata i są oparte na różnej metodologii pomiaru i ocen.

Podstawowe rankingi uniwersytetów świata, takie jak Academic Ranking of World Universities (ARWU), THE World University Ranking - Times Higher Education, Quacquarelli Symonds, Thomson Reuters, World's Best Universities Ranking - US News & World and Global Universities Ranking - Reitor (Peumop), są generalnie oparte na kryteriach oceniających w większym zakresie poziom badań naukowym, niż poziom edukacyjny.

Wyniki analiz stosowanych metodologii oceny doprowadziły autora do stwierdzenia, że złożoność zakresu wiedzy, którą absolwenci leśnictwa powinni poznać, a odnoszącą się zarówno do poznania zasad funkcjonowania ekosystemów leśnych z równoczesnym poznaniem zasad zarządzania nimi i dodatkowo- ich ochroną i użytkowaniem, wskazuje na zasadne stosowanie metodologii oceny jakości kształcenia opartego na systemie - „Benchmarking based on learning outcomes", a obiecującym przykładem jest tu Assessment of Higher Education Learning Outcomes Project (AHELO) - OECD

Introduction

Data on university education in forestry on a global scale is extremely difficult to compare directly. That excludes the possibility for further analysis and inference and requires constant refe-

rence to local and regional conditions, such as social organization, the level of economic development or cultural and linguistic zones, etc. The additional difficulties in acquiring global data on forest education at university level are caused by significant gaps in databases, both in national statistics and international ones.

However, it is possible to identify certain selected elements characterizing the forest at the university level education in a global context.

Research Methodology

Collection of materials used for this publication was based on the available resources located in libraries of international institutions and on national studies relating to a specific area of the world. The data used in this research included analysis of issues indirectly related to forestry education at the university level but it still allows to record a broader vision to problems of teaching forestry and forest research. Of particular importance here seems to be the report attributed to the results of research conducted by members of the various IUFRO Divisions and Working Groups within the Silva Network, and United Nations University, which is published in a form of methodical and detailed analysis relating to education in forest science.

FAO database on forestry education contains the contact information on 356 forestry education Institutions from 78 countries. However the database was last updated during 2000-2001 on the basis of information sent by the Institutions. Nowadays that database is not updated and verified and contains many errors and omissions, and in many cases cannot be treated as a fully reliable source of information.

Global Forest Information Service provides information which is not always up to date and does not properly reflect the facts either.

It should be noted that the FAO also promotes discussion on forestry education at the global level through the organization of international meetings together with international partners. Examples include an Expert Consultation on Forestry Education (Rabat, Morocco, October 2001), organized by FAO and the Meeting of International University Education Leaders (Vancouver, Canada, December 2001), organized by the University of British Columbia and FAO. Trends noted during those meetings include a decline in the quality and quantity of forestry students, perhaps due to a lack of employment opportunities for trained foresters and to the increasing need for other skills and expertise in forest management. Thus, forestry education is now absorbed into often a broader natural resources management curriculum.

Through support to regional networks of forestry education institutions, such as the Réseau des institutions de formation forestire et environnementale d'Afrique centrale (RIFFEAC), (FAO 2011) the following are promoted:

-improved coordination among forestry education, research and extension so that knowledge will be more accessible to all stakeholders;

-change in educational institutions and curricula based on the current and projected development needs of the society, which require new profiles for foresters;

-innovative and interactive methods of teaching and learning (e.g. distance learning and use of new information technologies).

-FAO also maintains a database on forestry education institutions and one on forestry short courses, both accessible on the Web.

Very large, deeply thought-out report is the development of the „FAO (2006): Status and needs of forest policy education in developing countries in transition. Results and recommendations of a survey" by G. Butoud and P. van Lierop, as well as the „FAO, ANAFE and SEANAFE. (2005): Forestry Education in Sub-Saharan Africa and Southeast Asia: Trends, myths and realities" by August, Temu, Per. G. Rudebjer, James Kiyiapi and Pieter van Lierop. Attention must also be paid

to the valuable publication, "Forestry education in Russia" by Victor K. Teplyakov 1994 and the results of international congresses and seminars.

The development of special interest deserve papers included in conference materials e.g. Forestry education responding to changing needs (FAO 2007), Forestry Leaders' Summit, Vancouver, Canada 2011, the results of the teams in the International Partnership for Forestry Education (IPFE), Forestry education, training and professional development in Africa (eds AB Temu., D. and B. Bishaw Okali, The PAWS-MED Experience-International Conference on Forest pedagogy in the Mediterranean Region (2011) and the 5th Latin American Forestry Congress, 3rd Workshop on Forestry Education in Latin America (Lima, Peru) in 2011.

The above mentioned resource data and the contents of published materials and scientific publications of the International Conference and Congress were the starting material for this study.

Results and analysis of results

It is assumed that one of the most authoritative sources of information about universities of the world are reports 'Global University Rankings and their impact' (2011) which state that there are currently over 16 000 universities operating in the world. However there are considerable difficulties in obtaining current statistical data on universities and faculties of forestry on a global scale and the problem is not solved by the information published on websites. In the Web browser, „Universities Worldwide", 8858 Universities are listed in 203 countries (December 24th, 2011). However, the same database includes only 15 universities in the name of „Forestry". Here they are:

1. Beijing Forestry University
2. Central South Forestry University
3. Dr. YS Parmar University of Horticulture and Forestry
4. Ho Chi Minh City University of Agriculture and Forestry
5. Hue University of Agriculture and Forestry
6. Mendel University of Agriculture and Forestry
7. Moscow State University of Forestry Engineering
8. Nanjing Forestry University
9. Southwest Forestry University
10. Thainguyen University of Agriculture and Forestry
11. Ukrainian National Forestry University
12. University of Forestry Sofia
13. Ural State Forestry Technical Academy
14. Zhejiang Forestry University
15. State University of New York College of Environmental Science and Forestry

Unfortunately, the number of forest education centres at the university level education in the world could not be determined. It can be assumed that the number of forest departments and Colleges of Forestry that offer a master's degree in forest science is between 400 and 600. That number includes colleges and forestry departments which are far away, differ in the level of knowledge conveyed, programs for the systematic monitoring and evaluation of the various aspects of a project, service or facilities to ensure standards of quality to be met.

There are various ways in which rankings can be grouped according to their purpose, measured parameters and the presentation of the results or the intended impact (Rauhvargers, 2011).

This causes difficulties in obtaining relevant comparative evaluation of universities since the evaluation methodologies applied are very different.

By adopting the classification of Thomson Reuters, Report of Findings 2011 (Table 1.), which refers to more than 4,000 universities worldwide, the ranking of universities shows a clear dominan-

ce of a few countries in the world. However it should be noted that this classification applies only to the evaluation of the university as a whole and not to individual departments or Faculties.

That ranking assumes that the highest point value (the maximum number of points = 100) is granted to the University with the highest level of education and at the same time graduates of those universities have the best chance of getting new jobs.

Table 1. ACADEMIC REPUTATION SURVEY

Top North American Universities 2011-2012		
1. California Institute of Technology	United States	94.8
2. Harvard University	United States	93.9
2. Stanford University	United States	93.9
Top European Universities 2011-2012		
4. University of Oxford	United Kingdom	93.6
6. University of Cambridge	United Kingdom	92.4
8. Imperial College London	United Kingdom	90.7
Top Oceania Universities 2011-2012		
7. University of Melbourne	Australia	71.9
38. Australian National University	Australia	71.2
58. University of Sydney	Australia	62.4
Top Asian Universities 2011-2012		
30. University of Tokyo	Japan	74.3
34. University of Hong Kong	Hong Kong	72.3
40. National University of Singapore	Singapore	70.9
Top African Universities 2011-2012		
103. University of Cape Town	South Africa	53.2
251-275. Stellenbosch University	South Africa	Data withheld by THE
251-275. University of Witwatersrand	South Africa	Data withheld by THE
Top South American Universities 2011-2012		
178. University of S?o Paulo	Brazil	44.1
276-300. State University of Campinas	Brazil	Data withheld by THE
351-400. Pontifical Catholic University of Chile	Chile	Data withheld by THE

source: Thomson Reuters. Report of Findings 2011.

In addition to university education in forest science, we also have to deal with the intense educational activities supporting and deepening knowledge of forest management among students and graduates of university studies. This applies both to the curriculum at postgraduate level, as well as special courses to update the knowledge of forest science. A lot of national and international institutions are involved in that process and they perform a broad spectrum of activities, among which I am going to mention only a few, e.g. The Directorate of Forest Education in India is responsible for controlling, coordinating and managing all the regular training courses in the country. Under the administrative control of that Directorate are, among others, the State Forest Service College, Dehradun (Uttar Pradesh) and the State Forest Service College, Coimbatore (Tamil Nadu).

The Forest Education Foundation in Tasmania (Australia) runs the National Forest Learning Centre where students can take part in a number of activities based on forest ecology, forest practices and forest products and which offers a wide range of learning opportunities for teachers and students about Tasmania's forests, their evolution, ecology and management over time as well as an insight

into the forest industries in Tasmania.

The MSc European Forestry programme provides academic education in forestry focusing on the international dimension of sustainable forest management issues. The programme is an extra dimension to the already existing educational markets in forestry and nature management in Europe. It is recognized by the European Union as a high quality programme of Erasmus Mundus status and is a top class taught master's programme in the field of forest sciences. The MSc European Forestry graduates are highly demanded by the international labour market.

The contribution of International Forestry Students Association (IFSA) to forestry students and education refers primarily to various initiatives to identify the most important needs and strategies adopted on a global and regional scale in terms of forestry education.

The complexity of the curriculum content in the departments of forestry was further complicated by the requirements imposed by both the development of forestry science and changes taking place in sectors outside of forestry. Here are some the selected requirements relating to the scope of knowledge of forestry after completing graduate studies at the university level.

Education related to forests and trees is crucial to achieving sustainable management and national sustainable development goals. Curricula need to be updated at all levels to include such topics, as the role of trees outside forests, collaborative management, gender equity, access and benefit sharing, the impact of certification schemes and participatory learning. By the same token, foresters must be given the opportunity to acquire skills outside the traditional realm of forestry ie. in communication, business administration and management sciences. Efforts are also needed to monitor and assess the ability of institutions to respond as demands evolve (Forestry education responding to changing needs, (FAO Dec. 2004).

Management of tomorrow's forests will be based on new methods and concepts which today's foresters must acquire. Sustainable forest management presumes a completely revised approach entailing greater recourse to ecological and social sciences (including political science). Tomorrow's forestry decision-makers will need a more systematic mastery of the disciplines involved in making rational public choices, based on both adequate scientific knowledge and on good understanding of social issues involved. The relative place of nature and society, the preservation of biodiversity and the maintenance of living standards are particularly important in this context (Butoud and P. van Lierop, FAO (2006).

In many publications, reference is also made to serious weaknesses in forestry education. There is a compelling need for intensive studies on the following main topics, among others:

1) Tracer studies for forestry graduates;
2) Curriculum analysis addressing especially the fragmentation of curricula; and
3) Delivery mechanisms, especially on how contextualized learning is approached. Some studies on how forestry education deals with multidisciplinary would also be interesting because they would help to pinpoint the causes of cross-sectoral problems.

Those studies would best be done at regional and sub-regional levels but the state studies and institutional studies would also be necessary because, eventually, the changes have to occur at the state level and an institutional levels (FAO, ANAFE and SEANAFE. 2005). At the international level there is more than ever a need to exchange information, share views, monitor global trends in forestry and advice on forestry education. Many discussions are now taking place at regional and sub-regional levels through networks in forestry education.

Mechanisms and tools to help forestry education institutions interact and exchange information. Those include networks at the national, regional and international levels to encourage conceptual debate.

The capacity of institutions and programmes should be reinforced and updated to respond to recent changes. There is a need to reorganize the teaching-learning system and to develop qualifica-

tions for continuing learning, such as critical thinking skills and analytical and problem-solving skills based on real issues. Forestry education should include the development of social skills necessary for foresters' role as advisers to forest users and as participants in dialogue with various stakeholders.

Forestry education curricula should respond to the evolving values assigned by society to forest goods and services. There is a need for an interdisciplinary focus in forestry education; the curriculum should include social and economic aspects. Teaching approaches should be sequenced to proceed from a holistic view to the specific one and should foster the understanding of the social, economic and biophysical dynamics in forestry. Forestry education, as an integral part of national forest programmes, should address the need for an integrated approach at technical and policy levels towards management, conservation and sustainable development of all types of forests. It should give attention to the link between forestry and agricultural sustainability and more specifically to the role of forestry in food safety, income generation and the livelihoods of different sectors of society (Expert Consultation on Forestry Education 2001. FAO).

Education related to forests is crucial to achieving sustainable management and national sustainable development goals.

Changes in approaches to forestry education are needed as forest policies and hence the role of foresters evolve in response to growing demand for forest goods and services, participation of multiple stakeholders in forestry and emphasis on food safety and poverty alleviation. Efforts are also needed to monitor and assess the ability of institutions to respond as demands evolve. (Education. FAO 2007).

Attempts to take a holistic approach to forestry education must have not only global but, perhaps above all, regional and local references. This is illustrated by the statements contained in the publication by Temu et. al. 2006, in which the authors argue that the overall direction in Africa is inappropriate „because it does not link to societal needs for social and economic development," concluding that „the future forestry education must also have an African face: that is, adequate technical substance that is contextualized in the African situation, solving African problems and fitting the social, cultural and economic settings, while at the same time remaining sensitive to the global society and the environment". Retraining serving foresters is a priority.

The problems in the educational process relate to regional conditions, and this also applies to Russia which, being the largest country and the world's largest forest resources, must include in the curricula both the natural variability of forests in all climate zones and social and cultural differences that occur in their territory. Outline of „The Future of Forestry Education in Russia" presented by Teplyakov (1994), states that „global changes and growing anthropogenic impact require foresters to better understand the roles and functioning of forests, to have a deeper knowledge of biological and ecological disciplines, and project the future relationships between forest, nature and society. Growing understanding of responsibility for the future of forests at local, regional or global levels and for the health of one person or mankind will bring ethics forest to the top position in forestry education".

One of the characteristic elements of education at university level in terms of global assessment is carrying out tests and measurements of the level of teaching, quality teaching and benchmarking, which are used in many countries and are based on different methodologies of measurement and evaluation.

The applied methods are based primarily on the following assumptions (Global university rankings and Their Impact 2011):

1. Academic rankings with the main purpose of producing university league tables and among them Academic Ranking of World Universities (ARWU), THE World University Rankings - Times Higher Education, Quacquarelli Symonds, Thomson Reuters, and the World's Best Universities

Ranking - U.S. News & World and Global Universities Ranking - Reitor (Peŭmop).

2. Rankings concentrating only on research performance (with or without league tables) and among them: Leiden Ranking - Leiden University, Performance Rankings of Scientific Papers for World Universities and Assessment of University-Based Research - European Commission

3. Multirankings - university rankings and classifications using a number of indicators without the intention of producing league tables, among them: CHE University Ranking - Centre for Higher Education Development / Die Zeit, CHE Excellence Ranking, U-Map classification - Multidimensional CHEPS and the European University Ranking System (U-Multirank) - EU funded project.

4. Web rankings based on the Webometrics Ranking of World Universities

5. Benchmarking based on learning outcomes based on the Assessment of Higher Education Learning Outcomes Project (AHELO) - OECD.

Generally, it is clear that all the previously used evaluation methodologies relating to the ranking of universities reflect university research performance far more accurately than teaching.

I think, that given the complexity of the scope of knowledge that forestry graduates should acquire, which relates both to becoming familiar with principles of functioning of forest ecosystems and simultaneously becoming familiar with management principles of those ecosystems and additionally their protection and use, it seems reasonable to use the methodology of assessing the quality of education based on system - „Benchmarking based on learning outcomes." One promising example is the Assessment of Higher Education Learning Outcomes Project (AHELO) - OECD, which will be tested after an assessment of over 150 universities.

Main Conclusions

1. The data relating to university education in forestry on a global scale is dispersed and allows a limited range of direct comparisons. It makes it difficult to conduct a deeper analysis and formulate proposals and requires, among other things, constant reference to local and regional conditions such as social organization, the level of economic development, cultural and linguistic zones, etc.
2. Additional difficulties in obtaining global data on forest education at university level are caused by significant gaps in databases, both in national and international statistics. However, it is possible to identify certain selected elements characterizing forest at the university level education in a global context. Those include, inter alia, the scope of knowledge in forest management curricula and, to a lesser extent, the requirements of employers towards graduates.
3. Generally, it is clear that all of the currently used evaluation methodologies relating to the ranking of university reflect research performance far more accurately than teaching.
4. It should be assumed that progress in the means and methods of communication during the educational process requires new forms of cooperation in the transfer of knowledge and skills in forest science.
5. The development of generally accepted standards for monitoring, verification and evaluation of both acquired knowledge and skills acquired by university graduates is considered necessary and is also the basis for further development of knowledge taught.

At the current stage of progress on those projects, it is considered that the Assessment of Higher Education Learning Outcomes Project (AHELO) - OECD meets the requirements.

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