THEORETICAL ASPECTS OF COMPETITIVENESS OF PRODUCTS OF AGRICULTURAL ENTERPRISES

Ye. V. Vasylkov

Abstract. *The article is dedicated to the actual problem – the competitiveness of products of agricultural enterprises, which are the subject of research of many modern scientists. The purpose of research is the generalization of the approaches of defining the essence of the concept "competitiveness of products of agricultural enterprises". In the article the approaches of defining the essence of the concept "competitiveness of products" were considered. The plurality of these approaches was influenced with their complexity and multidirectional of understanding of this issue among scientists. Specified definition of the concept of competitiveness of products was formulated. Further research of the problem may concern the evaluation and increasing competeveness of products of agricultural enterprises, the theoretical basis of which will be specified essence of investigated concept.*

Key words: *competition, competitiveness, competitive advantages, competitiveness of products, agricultural enterprises*

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FOREST MANAGEMENT AND CLIMATE CHANGE

L.R. VOLIAK, PhD, Senior Lecture of the Department
Statistics and Economic Analysis,
D.M. VOLOSHINA, student of Economic faculty
National University of Life and Environmental Science of Ukraine
I.S. HRYHORYEV, Manager
Wein und Sektgut Bamberger Company, Germany
E-mail: voliaklr@gmail.com, darina.voloshina1@gmail.com,
ihor.hrv@gmail.com

Abstract. *Adapting the management of forest resources to climate change involves addressing several crucial aspects to provide a valid basis for decision making. These include the knowledge and belief of decision makers, the mapping of management options for the current as well as anticipated future bioclimatic and socioeconomic conditions, and the ways decisions are evaluated and made. Weinvestigate the adaptive management process and develop a framework including these three aspects, thus providing a structured way to analyze the challenges and opportunities of managing forests in the face of climate change. Finally, our proposed framework for identifying* *adaptation strategies provides solutions for enhancing forest structure and diversity, biomass and timber production, and reducing climate change-induced damages. They are spatially heterogeneous, reflecting the diversity in growing conditions and socioeconomic settings within Europe.*

***Keywords**: behavioral adaptation; forest management; knowledge management; mathematical programming; process-based models; spatial planning.*

Introduction. Climate change is having and will continue to have a distinct effect on boreal forests in the northern hemisphere [1]. Such effects include shorter periods of ground frost; northward movement of the forestline; reduced snowfall and snowpack; increased risksfor fire, windthrow, and drought;and timberd a mage as a result of insects and fungi [2]. Not only will these changes affect forest composition but they can and should also alter the practices of forest management by landowners [3]. Thus, climate change is and will continue to be a major change factor for private forest owners in their forest management decisions.

Each climate change approach has a place within forest management not only at the national level but also within the management plans of non-industrial private forest owners (hereafter forest owners), who provide ecosystem services to their communities and are working to keep their forests productive for decades to come. Climate change considerations are especially important in parts of the boreal forest that are dominantly owned by private individuals and families.

Analysis of recent researches and publications. Research on environmental management, improvementorganizational and economic principles of forest managementhave been reflected in the scientific works of such scholars: G. Bondaruk,Y.Didukha, S.Lebeedevich, E.Mishenina, T.Tunitsy, O.Furdychka, I.Iarova and others.

Purpose. There are theoretical and methodological rationale for the role of forestryin adapting to the effects of climate change and mitigating them.

Methods. In the study the following methods are used: methods of systematization and generalization; a comparative methods – to analyze the dynamics of indicators of the volume and structure of enterprises; logical method – for a consistent generalization of theoretical and practical scientific research statements.

Results. In general, climate change will affect the forest conditions (area, health and vitality and biodiversity), allowing increases in growth rates in some areas while endangering the survival of species and forest communities in others. Temperature, availability of water and changes in seasonality may all become limiting factors, depending on geographic area, original climatic conditions, species diversity and human activities. Most commonly, these changes will affect the frequency and intensity of fires and insect pests and diseases, as well as damage done by extreme weather conditions, such as droughts, torrential rains and hurricane winds. In some cases, this may lead to expansion of forest areas; for example, temperate forests are expected to spread poleward. In other cases it may lead to reduction of forest areas, such as in the northeast Amazonian region, where forest dieback is expected to reach enormous proportions due to reduced availability of water, in combination with unsustainable land use practices. Provision of forest ecosystem services and goods will be altered by these changes, posing a number of new challenges to forest managers. In some areas, responses to climate change will affect the demand for forest products; for example, increased demand for forest-based fuels as a substitute for fossil fuels. Societies react to their perceptions of the actual and potential impacts of climate change on ecosystems by developing policies and a global survey by FAO found that, although most forest managers are aware of and concerned about climate change and its potential impacts, only few have clear ideas on how to prepare for and react to it. From these few, however, many interesting and important lessons may be learned. Possibly the biggest lesson is that sustainable forest management (SFM), the overarching vision for forests and associated principles that have been adopted by all members of the United Nations, is a sound foundation to guide forest managers' responses to climate change. SFM can help forest managers reduce the risk of damage and possible losses from changing climatic conditions and also to undertake effective mitigation actions.

Monitoring of changes is possibly the activity that would add most burden to forest management activities, since to date few effective and cheap ways to monitor changes have x been found and implemented. It is nevertheless important for future forest management operations, as it is mainly through monitoring that forest managers will be alerted to changes early on. In addition, several of the opportunities that are currently being discussed in relation to climate change, such as payment for ecosystem services, require monitoring to identify and measure services rendered.

However, several challenges have to be dealt with and flexible AFM strategies need to be defined because there is uncertainty about the degree of climate change [4], the influence on disturbance regimes, the speed with which changes happen, and the response of forests to the changing climate. Furthermore, decision makers may have their own perceptions and beliefs about the degree of change (and not the causes of climate change being anthropogenic or not), and they adjust decisions accordingly.

New information continuously flows to decision makers, affecting their beliefs and expectations about climate change. Behavioral decision research has started to investigate how forest owners relate to new knowledge, how they form and change perceptions, and how this affects their decision-making behavior [5]. Similarly, the impacts of climate change on the state and functioning of forest ecosystems and their components is the subject of a growing number of studies [6].

Case studies from different bioclimatic regions were selected to reflect the diversity of European forests (Fig. 1). They feature commonalities such as a focus on timber production and assessment of the impact of climate change on growth and competition, but different management goals were important in each case, e.g., risk management concerns such as forest fires; protection from natural hazards; optimization of biomass production; recreation; or nature conservation.

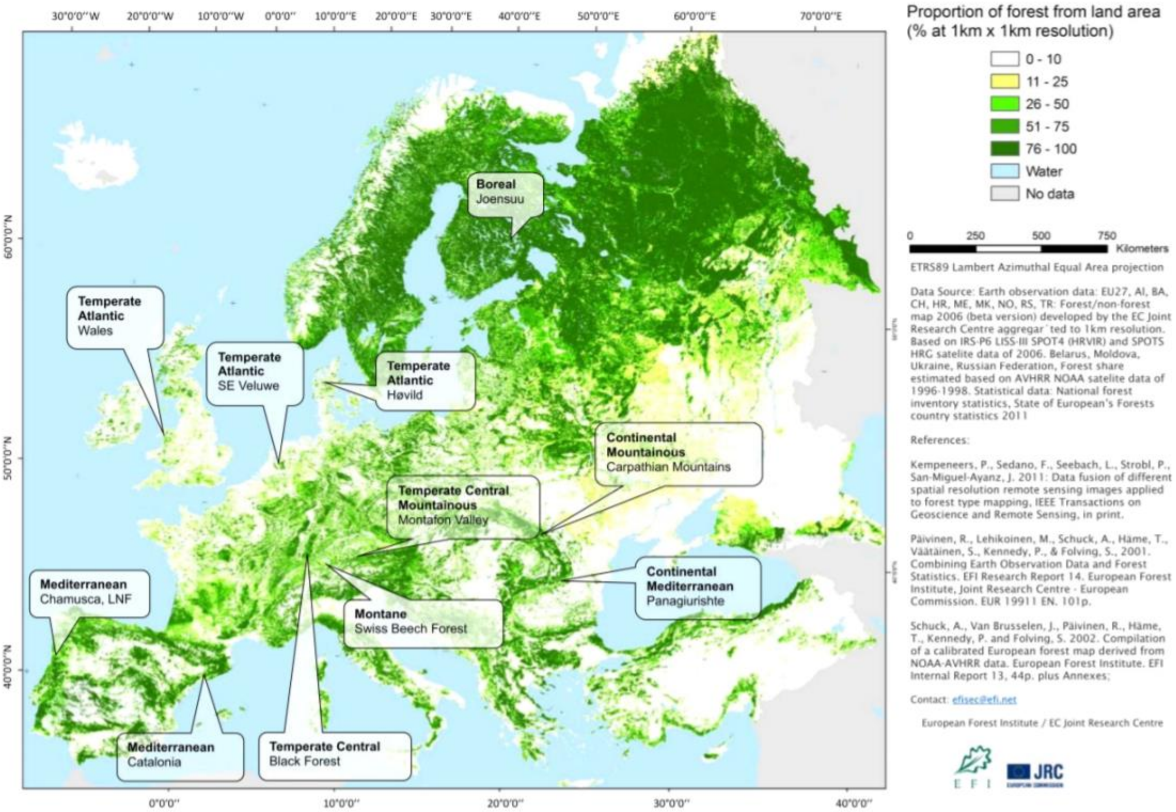

Fig. 1. Case studies representing the diversity of European forests (Source: European Forest Institute).

The framework for the evaluation of forest management adaptation to climate change requires the following:

1. available expert knowledge on climate change projections, impacts of climate change on forest ecosystems, and associated uncertainties;
2. knowledge of decision makers' perceptions of the phenomenon, their behavior in handling the associated impacts and risks;
3. knowledge of the way evidence is brought together by decision makers to form their beliefs about possible futures.

Below, we describe four stylized types of decision-making processes that differ in how they take into account uncertainty and new information on the state and development of the climate and evaluate alternative management decisions: the "no-change," the "reactive," the "trend-adaptive," and the "forward-looking adaptive" decisionmaking types (Fig. 2). The climate to be realized is unknown in all types, but available information is interpreted and applied differently in their assessment of the future.

The colors illustrate the different expectations of decision-making types. Blue is the observed and unique change in the past. Red is the expectation under "nochange decision making," where past treatments are repeated as long as they appear to work.

The black expectation refers to “reactive decision making,” where decisions are changed based on the observed change in the past. Green refers to “trendadaptive decision making,” where adaptation to the predicted trend occurs. Blue-grey shadows denote “forward-looking adaptive decision making,” where a range of possible futures is expected and where the expectations get broader, i.e., more uncertain, as we go more distantly into the future.

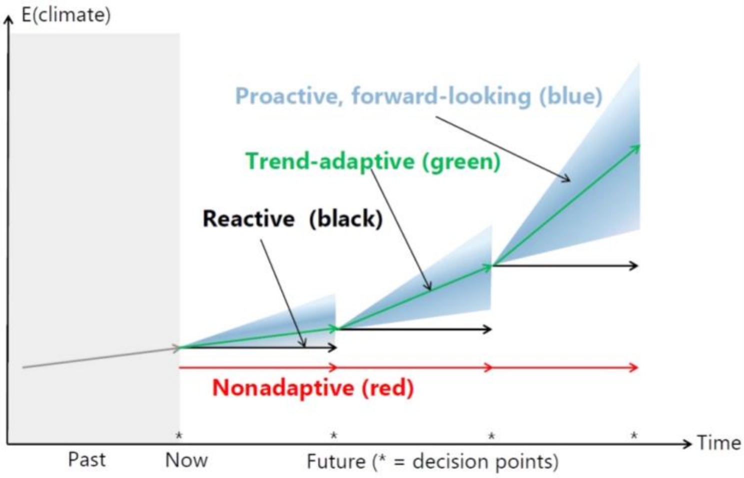

Fig. 2. An illustration of climate change expectations seen at time point “now,” i.e., ENow(Climate) to the several decision points in the future.

The no-change and reactive types of decisions making base decisions at any point in time on available information about past and present climate states only. The decisions do not depend on expected and predicted future fluctuations, trends, or asymptotic behavior of the climate. They differ in whether beliefs are updated to the currently observed climate or not (the point “now” in Figure 3). No-change decision making assumes that past climate will persist, and any temporary variation is just considered trendless fluctuations, so the best guess of the future is the original starting point.

However, when making a management decision, the uncertainty characterizing the situation is not fully taken into account, and the decision-making process is not designed to include learning. We return to this type of decision making in our discussion of simulation-optimization studies. Finally, in forward-looking adaptive decision making the state of the climate and the forest, as well as recent and ongoing climate change are observed, but instead of formulating expectations in the form of a single trend or scenario, the uncertainty inherent in the predictions of climate change and particularly in the likely impacts is acknowledged.

Decisions on adaptation vary across European forest landscapes, partly because the severity and importance of foreseen impacts of climate change differ among regions and partly because ecological as well as socioeconomic conditions vary. Decision-making tools are useful in exploring a large decision space subject to multiple goals and constraints and finding the most suitable adaptation strategy for forest resource management under climate change. Knowledge-based decision analysis is essential for the management of forest enterprises incorporating subjective beliefs of decision makers about climate change.

Decisions on whether to adapt immediately or to postpone adaptation in the hope of receiving more information in the future, should be made carefully using a real options approach. This guarantees the flexibility of changing decisions in the future and allows analyzing the trade-offs between high costs of irreversible decisions and damage caused as a result of delayed adaptation. . Re-evaluation of decision alternatives at later stages is recommended in order to take into account revised beliefs about climate change and its impacts and lessons learned from applying certain adaptive management options. Adaptation is most critical on poor sites in forest ecosystems that are highly vulnerable to climate change and its consequences and in areas where regulating and protecting forest ecosystem services are of great importance.

Conclusions and perspectives. Because climate change is a dynamic and complex phenomenon we need to (i) monitor its physical state, i.e., most indicative properties, to recognize the actual climate development, (ii) consider the impacts of this development on biological systems, and (iii) integrate knowledge and beliefs of decision makers into dynamic models of decision-making processes. Therefore, policies targeting the application of a single adaptive management strategy to a greater area, e.g., a region or an entire country, may be suboptimal for some forest owners and/or properties. This underscores that structured and transparent generation of decision alternatives should span a sufficiently large decision space. AFM strategies should at least aim at maintaining current forest ecosystem goods and services provision and at providing an opportunity to implement prevention strategies against increasing damages to forest caused by factors with high regional impact, i.e., disturbances such as forest fire, windthrow, and pathogen calamities. Forest resilience to climate change will be enhanced through fostering diversity at different levels, e.g., AFM and genetic adaptation. This starts with better consideration of genetic diversity in AFM strategies, but applies also to the combination of different AFM strategies at the landscape scale and the consideration of alternative decision-making approaches.

Literature

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2. Harris et al., 2009; Volney and Fleming, 2000; Stocks et al., 1998
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4. Allen et al. 2000, IPCC 2014
5. Blennow et al., 2016
6. Allen et al. 2010, Lindner et al. 2014, Hickler et al. 2015

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УПРАВЛЕНИЕ ЛЕСНЫМИ РЕСУРСАМИ И ИЗМЕНЕНИЕ КЛИМАТА

Л. Р. Воляк, Д. М. Волошина, И. С. Григорьев

Аннотация. *Адаптация управления лесными ресурсами к изменению климата предусматривает решение нескольких аспектов, которые включают в себя компетенции менеджеров, принимающих решения; разработку вариантов управления текущими, а также предполагаемыми биоклиматического и социально-экономическими условиями, а также пути оценки и математическое моделирование решений.*

Проведен анализ процесса адаптивного управления и разработана структура, включающая аспекты, которые обеспечивают структурированный способ анализа проблем и возможностей управления лесами в условиях изменения климата.

Предложена стратегия адаптации по воссозданию структуры и разнообразия лесов, производства биомассы и древесины и уменьшения повреждений, вызванных климатическими изменениями. Учтены пространственную неоднородность территорий, отражающие разнообразие условий в Европе.

Ключевые слова: *поведенческая адаптация; лесное хозяйство; управления знаниями; математическое программирование; модели на основе технологических процессов; пространственное планирование.*

УПРАВЛІННЯ ЛІСОВИМИ РЕСУРСАМИ ТА ЗМІНА КЛІМАТУ

Л. Р. Воляк, Д. М. Волошина, І. С. Григорєв

Аннотація. *Адаптація управління лісовими ресурсами до зміни клімату передбачає вирішення кількох аспектів, які включають в себе компетенції менеджерів, що приймають рішення; розробку варіантів управління поточними, а також передбачуваними біокліматичними та соціально-економічними умовами, а також шляхи оцінки та математичне моделювання рішень.*

Проведено аналіз процесу адаптивного управління та розроблено структуру, що включає аспекти, які забезпечують структурований спосіб аналізу проблем та можливостей управління лісами в умовах зміни клімату.

Запропоновано стратегію адаптації щодо відтворення структури та різноманітності лісів, виробництва біомаси та деревини і зменшення пошкоджень, спричинених кліматичними змінами. Враховано просторову неоднорідність територій, що відображають різноманітність умов в Європі.

Ключові слова: *поведінкова адаптація; лісове господарство; управління знаннями; математичне програмування; моделі на основі технологічних процесів; просторове планування.*