International Forest Fire News (IFFN) No. 30 (January – June 2004, 77-79)

Peatland Fires on Biebrza Marshes, Poland

The Research Programme

The description below accounts to the research programme, which consist of several research projects. The projects are independent activities, although they are all related with a topic of fire and they will cover a broad spectrum of research issues – reasons for fire, it's effects on soil, fauna, flora and management tools. It is intended that all this projects will have separate budgets and each of them can stands on it's own. Some of these projects are already going on, for other money was applied for and others are in preparations or in plans. The description which can be find below address the research programme and can be seen as a main outline of it. Different projects can be placed in this framework for research.

Project Title: Biebrza Peatland Fires – Reasons, Effects and Consequences for Nature and Management on Post-Fire Sites

General Aim

The aim of this integrated research project is to study the effects of the deep fires on the peat land. The focus of this research is on fen and moss-fen peatlands, which are rich ecosystems, often located in the river valleys and used by man in more or less intensive way. The focus of the study will be on:

- vegetation processes (species survival, succession),
- effect of fire on fauna
- the habitat changes (peat and soil conditions, detrimental chemical compounds)
- management on the post fire sites.

There are many types of fires with respect to its length, character, timing and impact on the living organisms and some of them are said to cause a serious loss of biodiversity and significantly change the habitats. The deep, underground peat fires are among the most destructive. Our purpose is to investigate the consequences of deep fires for the vegetation, animals and abiotic environment. We will also plan to explore the possibilities of applications the innovative techniques (Remote Sensing, modelling) to monitor, predict and prevent the fire.

Important question the project addresses is how to manage the post-fire sites in order to restore the valuable nature. We also would like to look how the fire acted as a management tool in the past and how it can be possible to apply fire as a management tool today.

We are going to explore risks of mismanagement, knowledge gaps and uncertainties about fire and finally the common opinion and legislation towards fires. Bringing together the theoretical concepts, new nature conservation paradigms and empirical knowledge we would like to formulate new policy towards management in nature sites.

Objectives

In order to be able to control the fire and properly manage the post fire areas monitoring, mapping and collecting information about the conditions before and during the fire as well as about the burning process is needed. Fight against the deep peatland fires is very difficult and sometimes practically impossible. To avoid fires or predict the risk of its occurrence, gaining knowledge about reasons and circumstances of fire in the peatlands seems to be essential. The following objectives should fulfil described needs:

- Map the burnt areas, based on Remote Sensing techniques and in-the-field measurements
- Describe spatial and physical features of fire
- Define the reasons, conditions and dynamics of fire
- Develop the early warning system (fire-alert model)

Elimination of vegetation and changes of soil cause a severe change in peatland ecosystem. On the post-fire sites the new processes of soil forming, vegetation succession and re-colonisation by fauna take place. The combustion of higher peat layers influences the conditions after the fire. Physical and hydrological properties of the peat remaining in deposit are being changed also, especially the volume density and porosity.

Long-lasting penetrating peatland fire is threatening for people not only on account of smog, but also on formation of highly toxic organic compounds, like polyaromatic hydrocarbons (PAHs). The following objectives of the project have been set in order to explore the ecological consequences of fire occurrence:

- Investigate the long- and short-term effects of fire on vegetation, species composition and succession processes
- Study the fire impact on habitat conditions
- Study fire impact on fauna
- The influence of compounds emitted during fire on human health

The peat land fire is usually perceived as a disaster for nature and source of negative effects on natural ecosystem. On the other hand fire can be seen as a natural force which brings back the ecological balance on the partly degraded and desiccated peat lands. It is a drastic disturbance that removes the layer of dry, degraded peat and allows new peat formation processes to start. Thus fires on peatlands may draw back the succession stages and help with re-establishing of the low vegetation. Fire can be also a management tool useful to stop or slow down the succession on the abandoned wet meadows. Farmers on the extensively maintained wet meadows, sedge meadows and heather often used it with in the past.

The objectives of the project related to management are as follows:

- Develop the management options to maintain and restore the valuable vegetation and fauna on the post-fire sites
- Investigate the impact of different management measures on post-fire sites
- Develop effective monitoring system on the post- fire sites

Outcomes and Plans

International co-operation: Fire is a problem of the international importance. In many cases they cause a loss of already partly desiccated, scattered and fragmented peatlands and contribute to the CO_2 emissions to the atmosphere.

In many countries (Scotland, Netherlands, Sweden, Finland) fire was use in the past to maintain the extensively used areas and remove the dead biomass. Today fire is a potential management tool, which may help to restore some types of ecosystems, however we don't have enough knowledge on this topic. In order to explore and understand the complex issue of fire we should work internationally and develop a strong network of partners. We also would like to explore the nature policy. In order to provide sufficient means for further project realisation, we aim at exploring new financial sources (like EU funds). We believe that by means of promoting nature management partnership, exchange of ecosystem expertise, strengthen the relationship between sustainable agriculture and nature management our project will be a true implementation of biodiversity protection policies. Within this project we aim at international collaboration, which contributes to sustainable development in Poland but also benefits nature in other European countries. In this project we would like to start a fruitful co-operation between various research institutes, nature management organisations and non-governmental organisations from Poland and Germany, the Netherlands and hopefully in a future also Baltic States, Slovakia, Czech Republic, Hungary and others. In this way we would like to bridge a gap between science, policy, private and public parties. The international co-operation on this topic will also significantly contribute to capacity building of scientific staff of institutes from Poland and abroad.

Long-term goals. These goals include:

- Develop the rules for monitoring of fires and effects of fires on biodiversity (on the local, regional and international scale)
- Investigate the succession processes on the post-fire areas (including fauna and flora)
- Investigate the impact of fire on other ecosystem processes – like soil processes and hydrological regimes
- Assess use of fire as a tool in nature management and nature conservation. Develop the guidelines how to use it and evaluate the risks and limitations of using the fire

- Develop the network of the research institutions and other organisations (e.g. NGOs), which work on the topic of the peatland fires

Short-term goals. The goals include:
- Assess the impact of fires on different elements of biotic and abiotic environment
- Explore the application of remote sensing techniques in burnt area mapping and monitoring different processes occurring on this places. Explore the application of remote sensing together with GIS methods and modelling in evaluating the risk and preventing the fire
- Monitor the vegetation, soil and fauna changes and succession on the post-fire sites
- Start the post-fire management experiments in order to develop the best options for nature restoration

During the first phase (2003-2004) we established a network of experts, coming from field of science, management and policy-making. We are aiming at building partners network, develop the full research programme and explore the funding possibilities. We are also planning to organise workshop meeting and participate on seminars on this topic, in order to strengthen the collaboration with international and national partners. The projects in second phase (2004-2008) will allow starting long-term research on vegetation structure and processes, management options on the post-fire sites and establishing the on the post-fire areas. In long-term this project would contribute for hydrological and ecological models, biodiversity assessments and estimations of role of wetlands in global climate change. Changes caused by fire should be considered in the hydrological and ecological models, describing the functioning of wetlands.

Scientific and practical outcomes: After each research project a separate report will be prepared and presented to the co-operating institution. A number of scientific publications will be prepared. It will provide the high quality scientific research, which will support the future research projects on this topic and the nature management in peatlands. The outcome of the project will be also predictions of fire risk on peatlands. During the part of the project dedicated to management, different management options will be compared. The guidelines for sustainable protection and management of nature and landscape will be developed as well as widely supported policy options on response to fires on peatlands. This knowledge will help in setting appropriate nature management and fire and post-fire monitoring in the region and elsewhere.

Research Area

The study is carried out in Biebrza River valley, in Northeast of Poland. Biebrza Marshes are known as a reference area for many fen peatlands and river valley wetlands, due to outstanding and well preserved nature, and due to character and magnitude of natural processes taking place there. The research areas will be selected in Biebrza National Park (BNP) and its surrounding (e.g. buffer zone). Since the national park was established the fires took place there almost every year. Deep-seated fire, i.e. penetrating to lower layers of peat deposits occurred in Biebrza National Park, where it destroyed several hundreds hectares of fens. Some of the burnt areas will be investigated. The study plots can be located in the Middle Basin of the valley, close to the Kapice village, where an area of several hundred hectares was burnt in 2002. Other possible study plots are: “Triangle” north of Goniadz town also in the Middle Basin and Bagno Lawki in the Lower Basin of Biebrza valley. The specific locations will be defined later during the project implementation.

IFFN Contribution by

Ms. Agata Klimkowska
Department of Environmental Sciences, Environmental Systems Analysis Group
Wageningen University
P.O. Box 8080
6700 DD Wageningen
Netherlands

Tel: +31-317-484812
Fax: +31-317-484839
e-mail: A_klimkowska@hotmail.com