Institute of Forest Ecology SAS

INSTITUTUM OECOLOGIAE SILVAE SAV ZVOLEN

FOREST ECOSYSTEMS

COMPLEXITY

Terrestrial unit of living organisms (plants, animals and microorganisms)

Interactions among organisms and with the environment (soil, climate, water and light)

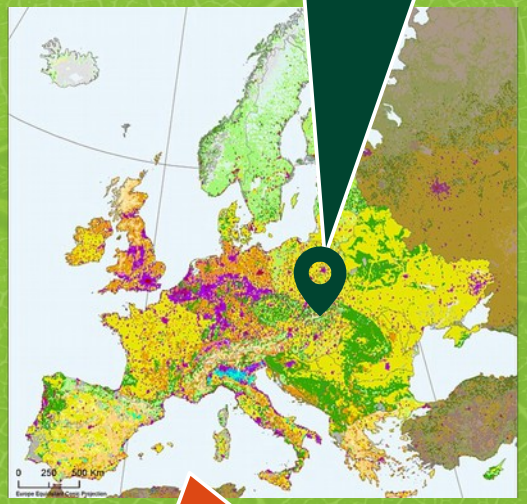
FUNCTIONS

Oxygen pump
Air conditioner
Giant sponge
Wind breaker
Biodiversity source
Filter of pollutants
Resources
Nutritions and medicals
Relax

Forests, human impact and global change

Different forest cover

Institute of Forest Ecology SAS



Impact of human activities

Effects of climate change

1. Institute's background

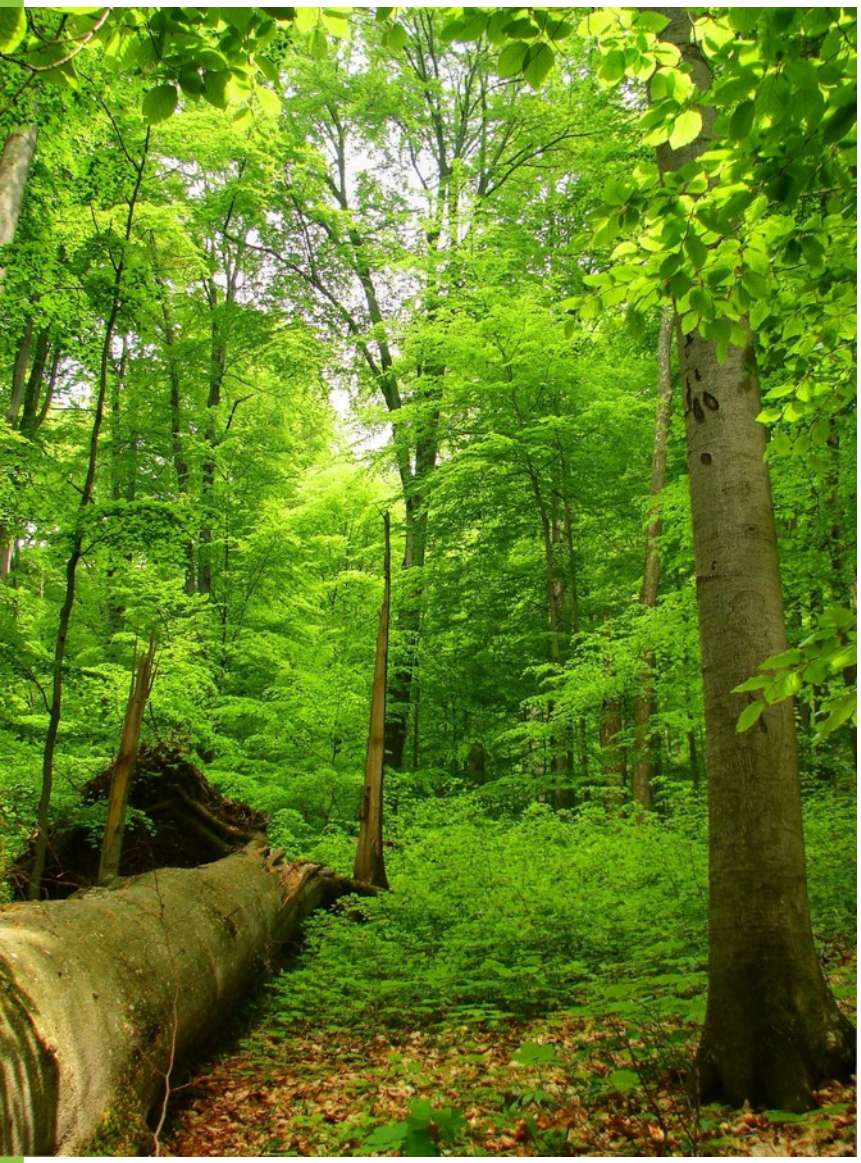
Since 1983

Rooted in the history

- František J. Turček – the first Slovak (forest) ecologist arrived to SAS (1964)
- Forest Ecosystem Research Branch in Zvolen (1983–1987)
- Institute of Forest Ecology (1987–)

Enlargements

- Workplace in Nitra (1992)
- Workplace in Bratislava (2012)
- Arboretum in Mlyňany (2014)



OUR MISSION

Basic and applied research on forest environment which is undergoing considerable changes due to massive human exploitations and/or natural disturbances

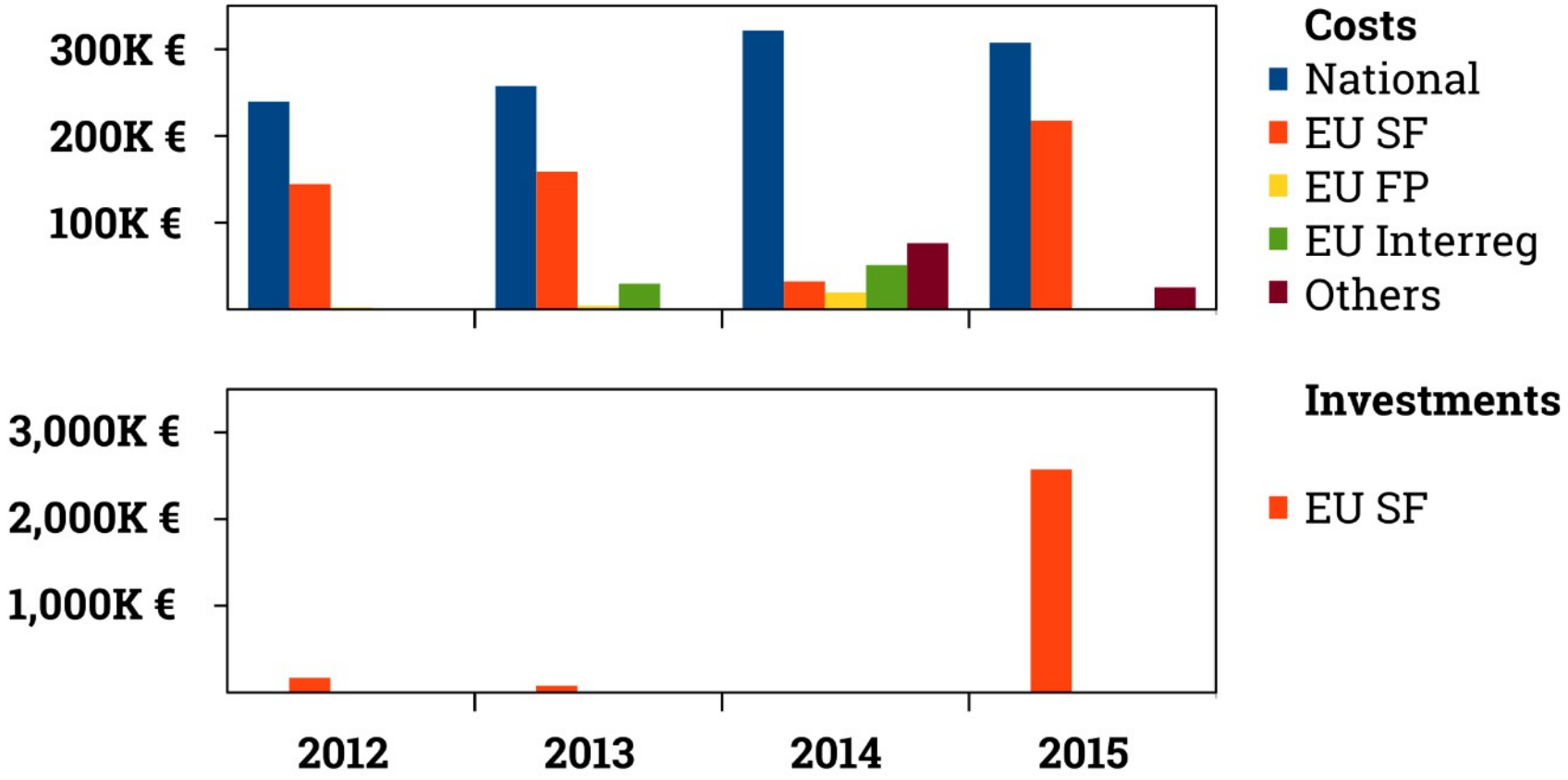
Study of forest biodiversity, processes in ecosystems, responses and adaptations of organisms and associated social aspects

STAFF (2012–2015)

	Average per year
Researchers	**66**
PhD-students	**12**
Supporting staff	**36**

	Average per year
Mean age	**45**
Gender equality	**1.0 : 1.3**
Salary budget	**913,000 €**

PROJECTS (2012–2015)



COOPERATION (2012–2015)

cost
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY

14 *actions*

PhD.
Ecology

TECHNICAL UNIVERSITY IN ZVOLEN

UNIVERSITAS COMENIANA BRATISLAVENSIS MCMXIX

CHINESE ACADEMY OF SCIENCES

BOKU UNIVERSITÄT FÜR BODENKULTUR WIEN

NÁRODNÉ LESNÍCKE CENTRUM NLC NATIONAL FOREST CENTRE

STU
SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA

CZU
CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Mendel University in Brno

CzechGlobe
Global Change Research Centre AS CR, v. v. i.

SLU

METLA

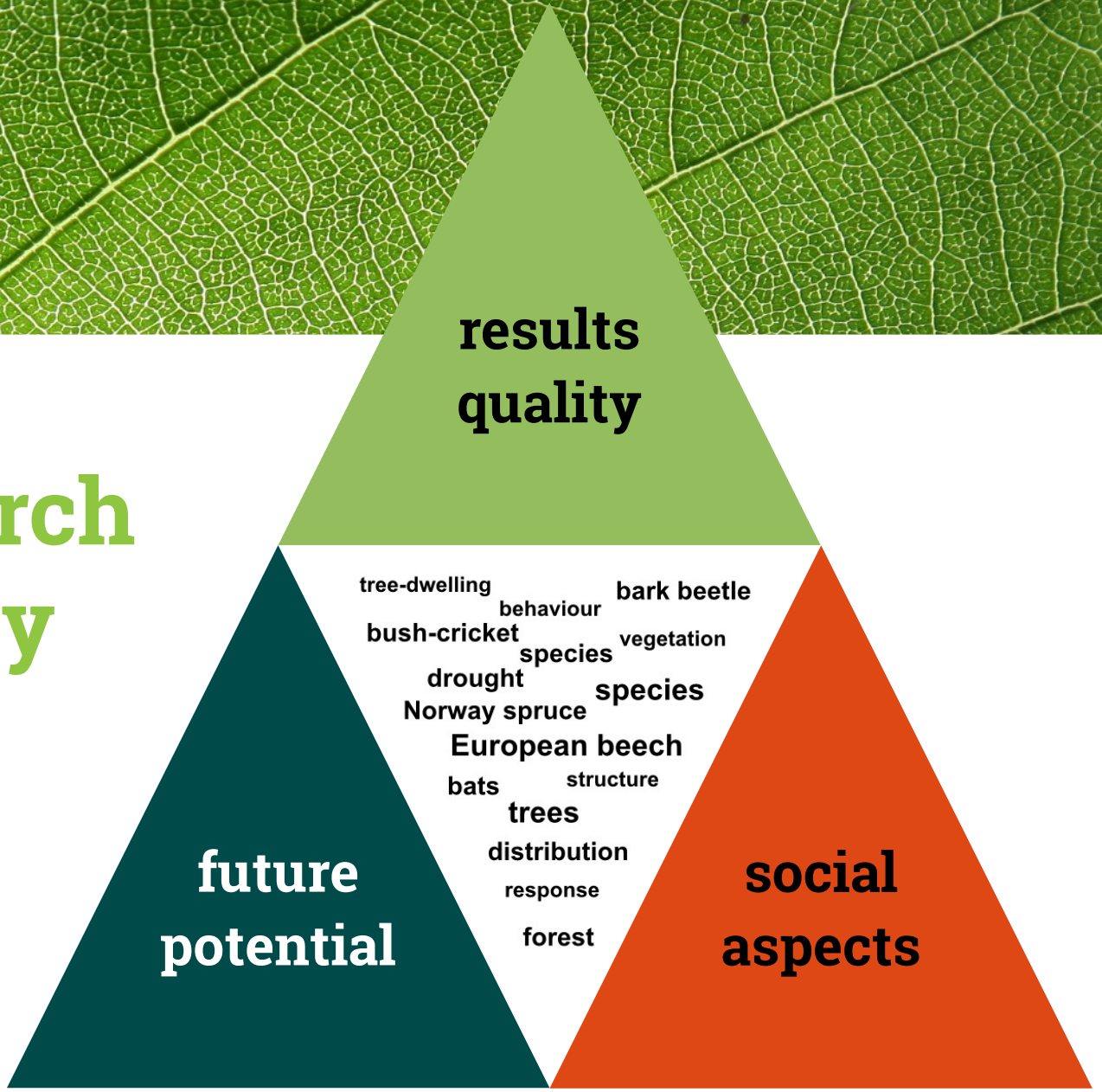
European Society for Ecological Economics
ESEE

HUMBOLDT-UNIVERSITÄT ZU BERLIN

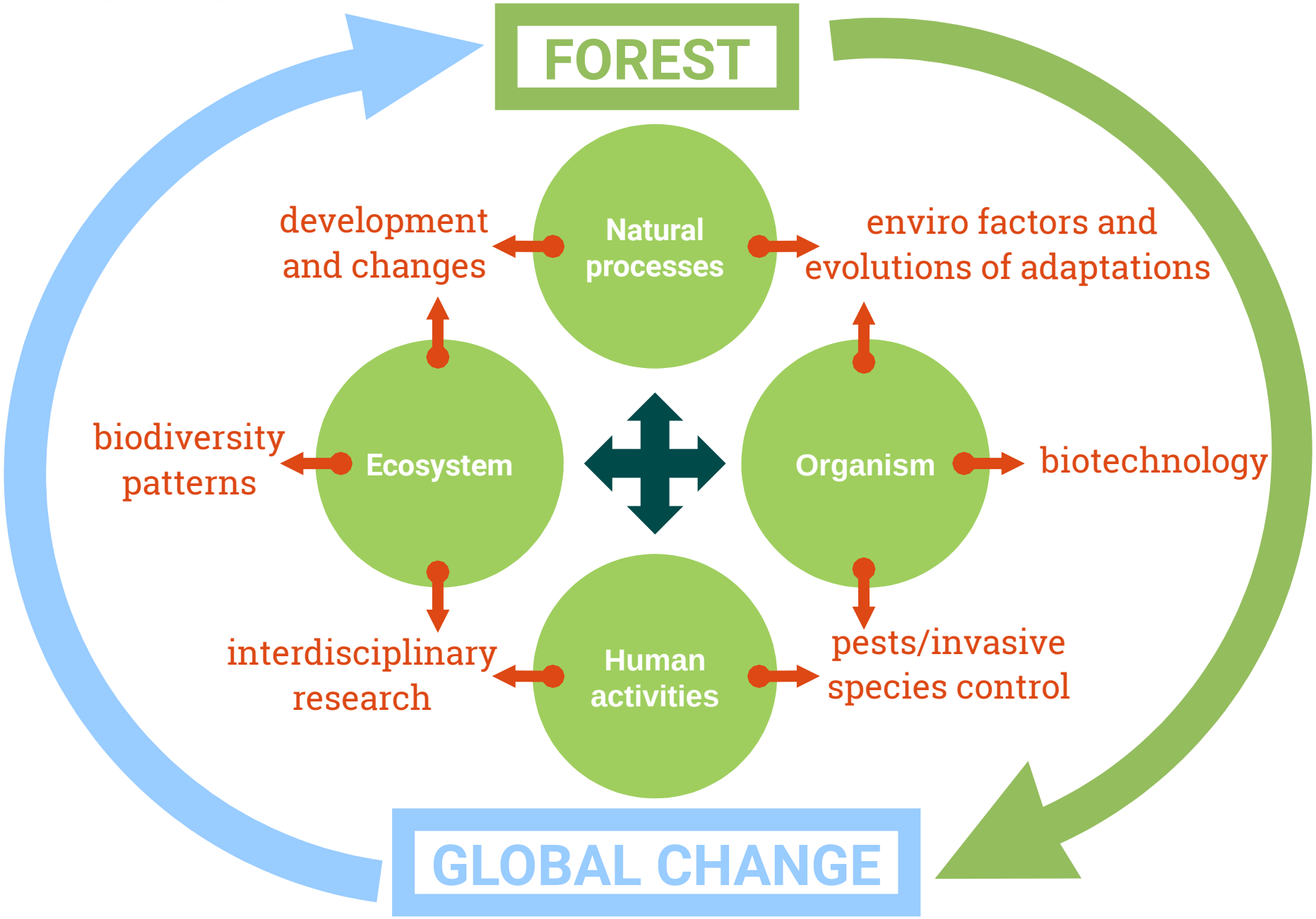
WSL

2. Research summary

2012–2015

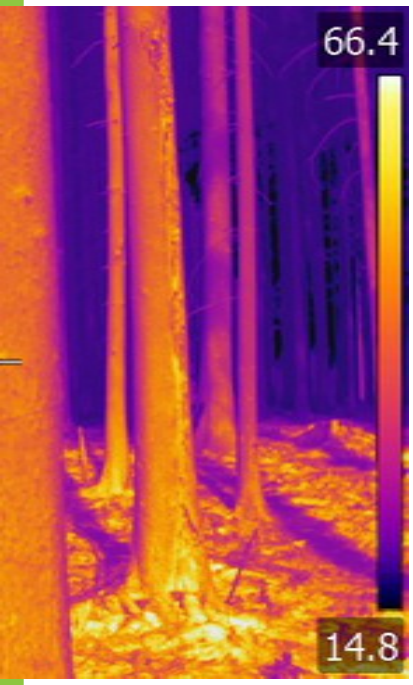


Complex approach



EFFECTS of GLOBAL CHANGES on FOREST ECOSYSTEMS and WOODY PLANTS

Effects of global changes on forest ecosystems and disturbance regimes



- Development of **decision support system** for management of spruce forests affected by disturbances (wind, bark beetles)
- Assessment of ecosystem long-term dynamics and impact of environmental factors on bark-beetle — host-plant interactions using **hi-tech infrastructure**

Stress factors and adaptive potential of forest trees

- Analysis of the **critical values** of environmental factors (simulated drought stress) causing **changes in physiological processes** of forest trees
- Understanding the **responses of trees to new conditions** arising from on-going climate changes with focus on economic forest tree species providing important **ecosystem services**

Pollution, stand regeneration and litter decomposition in forests

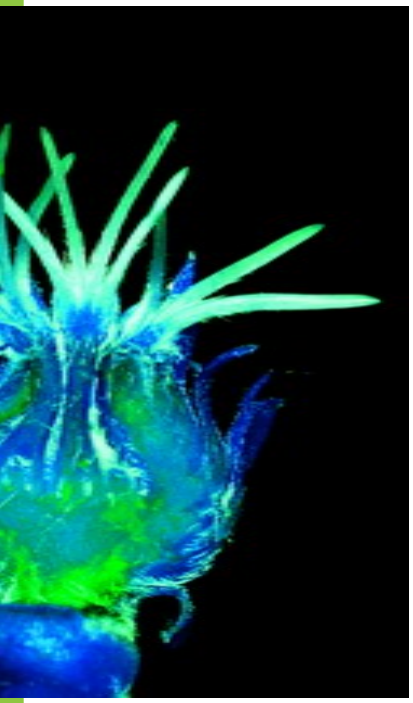
- **Longer-term changes** in natural stand regeneration in areas of different **pollution load** and after applying different **felling methods**
- **Organic matter** as the contributing factor to climate change due to **CO_2** that is released into the atmosphere during decomposition

WOODY PLANTS in URBAN ENVIRONMENT and BIOTECHNOLOGY

Parasitic fungi and woody plants interactions

- Parasitic microscopic fungi as important disease vectors or bacterial pathogens causing **plants damages, cankers and gradual dieback**
- Modelling and **mitigation of adverse effect** of fungal pathogens on woody species and **integrated system of trees and forest protection**

Plants biotechnology and pests control



- Development of new methods in integrated tree protection using of **entomopathogenic fungi** and study of ornamental plants as sources of **bioactive compounds for human therapy**
- Improvement of vitality and enhancement of reproduction of ornamental trees due to **social and economic aspects** in **urban ecology**

Genomics and proteomics of honeybee royal jelly

- Solving the serious problems in the current beekeeping via **physiologically active compounds of honeybee products**
- **Improving the EU standards** for honey authenticity and quality, that will protect consumers against the honey adulteration

BIODIVERSITY, INVASIVE SPECIES and EVOLUTIONARY BIOLOGY

Habitat selection and foraging ecology of endangered and rare animals

- Colonisation pathways, population history and the impact of forest fragmentation on **distributional patterns, genetic structure and morphology** of various animals
- Exploring and understanding of habitat and foraging **preferences of species in changed conditions** with focus on **umbrella species**

Risk assessment of native and non-native insects' performance in forests

- Spreading of non-native and/or invasive insects species as a result of climatically and human induced **changes in forest ecosystems**
- Determination of factors that influence **spatial and temporal dynamics** of species, mostly herbivorous insects and their predators

Behavioural algorithms for solving complex tasks

- Cutting-edge research on algorithms maintaining (i) **group cohesion** of social animals and (ii) optimal **mating strategy** in systems with sexual conflict
- **Evolutionary adaptations** in species survival and development of **bio-inspired computational tools**

INTER-DISCIPLINARY RESEARCH

Human dimension of global environmental change and ecosystem services

- Study on variables of behavioural changes towards **sustainability and innovations in strategic decision making** using multiple methods (experimental approaches, agent based modelling, institutional analyses, remote sensing and GIS analyses)
- The role of **ecosystem services**, self organisation and innovative incentive mechanisms of **natural resources and land use under the global change**

3. Scientific outputs

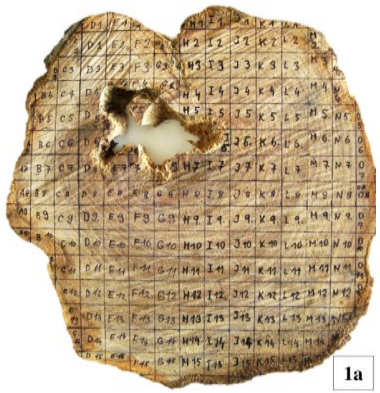
2012–2015

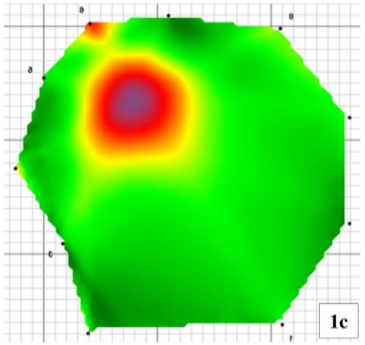
PAPERS (Web of Science™ Categories)

Top 10	% of 81
FORESTRY	22
ECOLOGY	17
BIOLOGY	10
PLANT SCIENCES	10
ZOOLOGY	10
ENVIRONMENTAL SCIENCES	7
AGRONOMY	5
BIOCHEMISTRY MOLECULAR BIOLOGY	5
ENTOMOLOGY	5
EVOLUTIONARY BIOLOGY	5


The most important contribution?
Disturbance Ecology
Trees and Forest Protection
Behavioural/Evolutionary Ecology
Biodiversity Conservation

4. Strategy in applied research





- Further development of decision support systems for the **management of spruce ecosystems** (TANABBO)
- Management of spruce **bark beetle** populations using **attractants and anti-attractants**
- **Effects of fungal pathogens**, assessing the host range and the level of their pathogenicity on **woody species**
- New biological products for the **control of selected forest pest species**
- Methods based on acoustic tomography for **tree stability assessment in arboristics**
- Research on **royal jelly honeybee proteins/peptides** with potential for **medical utilisation**

5. Education, public & media

Arboretum Mlyňany

Every year!

40,000 visitors

3,000 students

>100 excursions

TV, radio, press, internet

208 articles

432 in media

and many more...

“

A people without children would face a hopeless future; a country without trees is almost as helpless.

Theodore Roosevelt