



# BIO-ECOLOGICAL STATIONS

FOREST RESEARCH INSTITUTE  
BULGARIAN ACADEMY OF SCIENCES



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# Bio-ecological stations - FRI-BAS

„VASIL SERAFIMOV“  
SFE Yakoruda, 1961

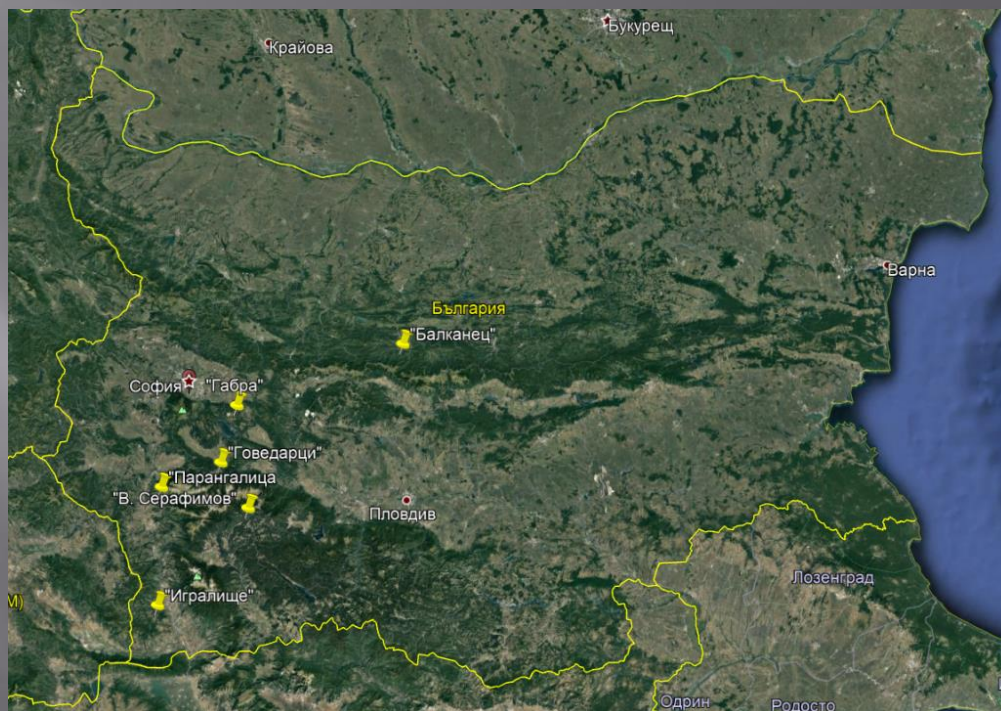
„GOVEDARTSI“  
SFE Samokov, 1963

„BALKANETS“  
SFE Troyan, 1971

„PARANGALITSA“  
NP "Rila", 1979

„IGRALISHTE“  
SFE Tsaparevo, 1970

„GABRA“  
SFE Elin Pelin, 1973



## Priority research

- Studies on the structure, functioning and adaptation of forest ecosystems to climate change;
- Studies on ecosystems' pollution;
- Optimization of management and utilization of forest resources.

# Bio-ecological stations

Program for complex stationary research of FRI-BAS

## 1. Study of the structure of ecosystems

### 1.1. Biotope

1.1.1. Soil

1.1.2. Climate

### 1.2. Biocenosis

1.2.1. Forest stands

1.2.2. Grass, shrubs, lichens, fungi

1.2.3. Fauna

1.2.4. Microflora

## 2. Study of the functioning of ecosystems

### 2.1. Biogeochemical cycle of the substances

2.1.1. Water cycle

2.1.2. CO<sub>2</sub> and O<sub>2</sub> cycle

2.1.3. Micronutrient cycle

2.1.4. Macronutrient cycle

### 2.2. Productivity of ecosystems

2.2.1. Primary

2.2.2. Secondary

## 3. Pollution of ecosystems

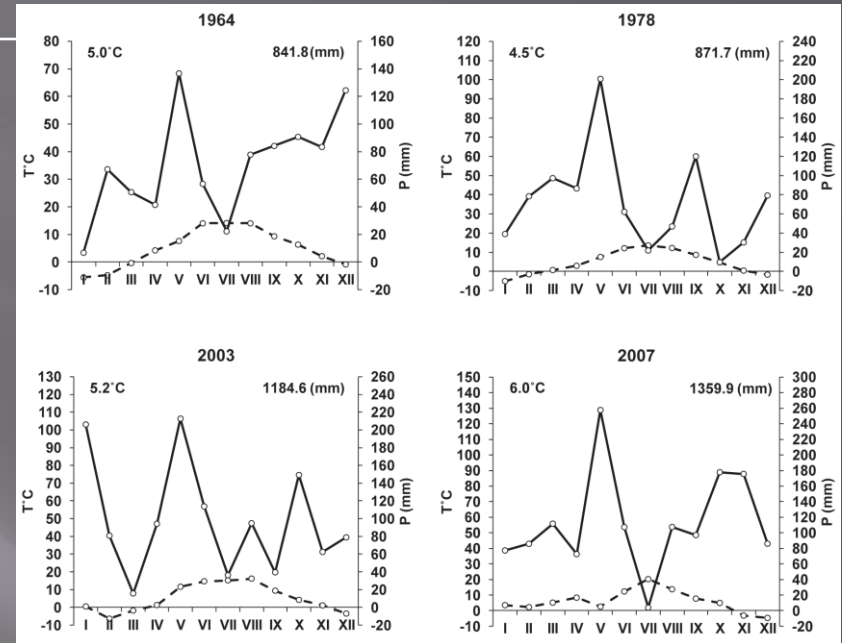
3.1. Chemistry of precipitation

3.2. Chemistry of lysimetric waters

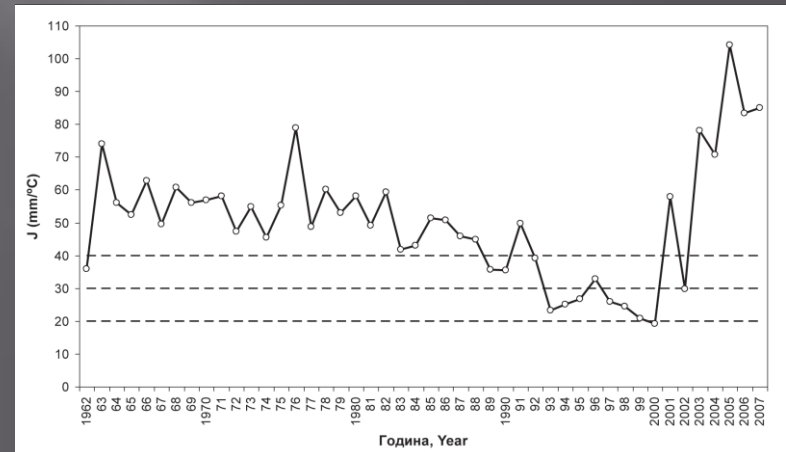
3.3. Chemistry of river waters

## 4. Optimization of management and utilization of forests

Study the effect of the implementation of different management practices



Walter-Lieth Climatograms for 1964, 1978, 2003 и 2007



Change in indices for average annual temperatures (index T) and indices for annual precipitation amounts (index P) 1962-2007 г. – “V. Serafimov”

# Bio-ecological station “Vasil Serafimov”

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- The first station for hydrological research at the FRI-BAS - started in 1961.
- It is located in the Leeva area, in the eastern part of Rila Mt.
- Measurements of air temperature, precipitation, interception, stem runoff, snow cover, soil evaporation, surface water runoff and deep infiltration in representative forests of Scots pine (*Pinus silvestris* L.).



Included in the European network of stations for long-term research in forest ecosystems and landscapes of the European Union (ENFORS - COST E25) since 2003.

# Bio-ecological station “Vasil Serafimov”

- Forests - 1550 m a.s.l. characterizing climate conditions in the range 1400-1700 m a.s.l.
- Southern exposure, slopes - from  $10^{\circ}$  to  $30^{\circ}$
- Soils - Cambisols (Dystric)
- Age 100-110 years
- Average diameter 28-30 cm;
- Average height - 27 m;
- Average stock 550-600 m<sup>3</sup>/ha

(Raev, 2006)

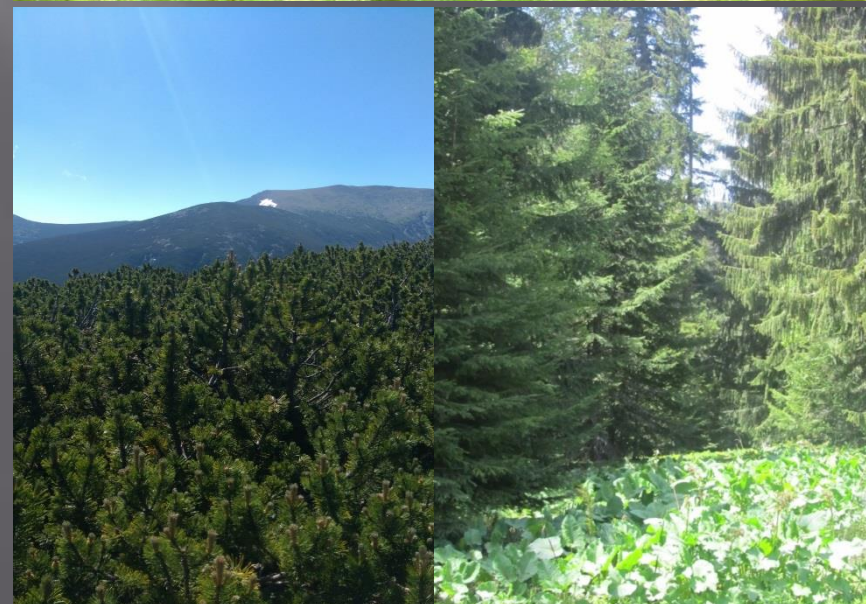
**Year:** 1961 -  
**Lat./Long.:** 42°07' N; 23°45' E  
**Alt.:** 1440-2010 m a.s.l.  
**Area:** 197 ha  
**Forest:** G3.4C South-eastern European  
[*Pinus sylvestris*] forests  
G3.1E1 South-eastern Moesian  
[*Picea abies*] forests



# Bio-ecological station “Govedartsi”

- Established in 1963 - located in the Malyovishki part of Rila Mt., in the catchment area of the Cherni Iskar River in the area of Govedartsi village - SFE Samokov
- Ecological studies in spruce (*Picea abies*) and fir (*Abies alba*) forests and dwarf pine communities (*Pinus mugo*) - in the range from 900 to 2100 m a.s.l.
- Experimental polygons - 10
- Exhibitions - northern component
- Slopes - 15<sup>0</sup>-30<sup>0</sup>;
- Soils - Dystric Cambisols - Humic
- Stands - spruce aged 105-115 years
- dsr.- 35 cm; Hsr. - 28 m; average stock - from 700 to 1000 m<sup>3</sup>/ha (Raev, 2006)

Included in the European network of research stations for long-term monitoring in forest ecosystems and landscapes of the European Union (ENFORS - COST E25)



# Bio-ecological station "Govedartsı"

Studies of the biotope - (climatic, edaphic factors) and biocenosis (stand, grass and other vegetation, fauna, microflora)

Substances cycle - water,  $CO_2$  and  $O_2$ , micro and macronutrients

Ecosystem productivity (primary, secondary)

Pollution of ecosystems - chemistry of precipitation, lysimetric and river waters

Optimization of management and utilization of forests (implementation of different management practices)

„Assessment and monitoring of the impacts of air pollution on forest ecosystems "(ICP-Forest-ECE), (ICP-Forest, 1985-2005)

**Year:** 1963 -  
**Lat./Long.:** 42°16' N; 23°28' E  
**Alt.:** 1250-2704 m a.s.l.  
**Area:** 724 ha  
**Forest:** G3.1E1 South-eastern Moesian [Picea abies] forests  
G3.16 Moesian [Abies alba] forests  
G3.4C South-eastern European [Pinus sylvestris] forests



# “Govedartsi”

Genetic and selective studies were also performed in geographic plantations of spruce (*Picea abies* (L) Karst. and Scots pine (*Pinus sylvestris* L.).

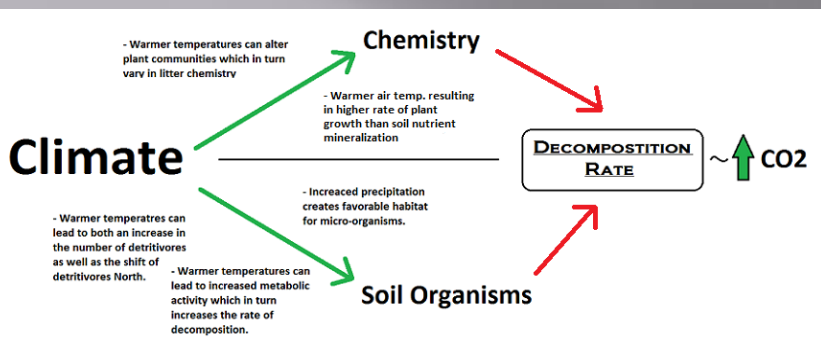
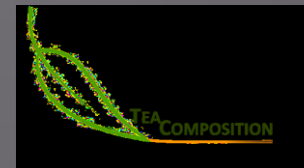
The experimental plantations were established in the area of the Madjarsko region (1250 m a.s.l.) in a block scheme - 2x2 m.

Provenances are from all natural habitats of spruce in our country, as well as from some European countries. It includes some Bulgarian origins of Scots pine and 3 Romanian provenances.



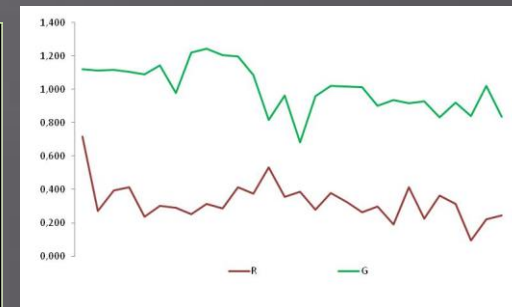
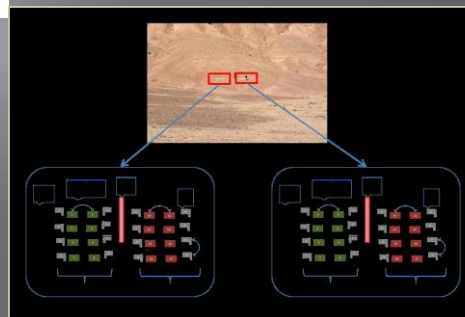


# Bio-ecological station "Govedartsi"



## Tea Composition initiative - 2016 570 sites - nine terrestrial biomes

- to study long-term aspect of the rate of litter decomposition in different land-use and climate scenarios



Mass loss for Rooibos and Green tea

Unit or note:	example row - fill in your data from row 21			addition, warming, CO <sub>2</sub> , fertilizer, Disturbance,	monoculture, deciduous monoculture, mixed	was done after 3, 12, 24 or 36 months incubation			Year	Month	Day	Year	Month	Day		cm	cm	gram (g)	gram (g) incl. bag, string and tag	gram (g)	
Site ID	Site name	Tea or litter Type	Treatment	Treatment extra - choose from the list above	if forests then add forest type from list above	Period you sampled bags	Plot	Sample ID	Year of burial	Month of burial	Day of burial	Year of recovery	Month of recovery	Day of recovery	Soil Horizon	Layer depth (start)	Layer depth (end)	Initial weight	Mean default weight of 40 empty tea bags	Weight of the tea (withouth bag) post incubation	Comments
26	Govedarci	Rooibos Tea	natural forest				4	GPA(R54)	2016	6	30	2016	9	30	0	0	5	2,007	0,248	1,227	Damaged
26	Govedarci	Rooibos Tea	natural forest				4	GPA(R58)	2016	6	30	2016	9	30	0	0	5	2,062	0,248	1,458	
26	Govedarci	Rooibos Tea	natural forest				4	GPA(R62)	2016	6	30	2016	9	30	0	0	5	1,737	0,248	1,489	
26	Govedarci	Rooibos Tea	natural forest				4	GPA(R63)	2016	6	30	2016	9	30	0	0	5	1,754	0,248	1,506	
26	Govedarci	Green Tea	natural forest				4	GPA(G54)	2016	6	30	2016	9	30	0	0	5	1,971	0,248	0,906	
26	Govedarci	Green Tea	natural forest				4	GPA(G55)	2016	6	30	2016	9	30	0	0	5	1,975	0,248	0,764	
26	Govedarci	Green Tea	natural forest				4	GPA(G61)	2016	6	30	2016	9	30	0	0	5	1,943	0,248	1,011	
26	Govedarci	Green Tea	natural forest				4	GPA(G65)	2016	6	30	2016	9	30	0	0	5	1,986	0,248	0,778	
26	Govedarci	Rooibos Tea	natural forest				4	GPA(R57)	2016	6	30	2017	6	30	0	0	5	2,089	0,248	1,182	
26	Govedarci	Rooibos Tea	natural forest				4	GPA(R60)	2016	6	30	2017	6	30	0	0	5	2,048	0,248	1,222	
26	Govedarci	Rooibos Tea	natural forest				4	GPA(G57)	2016	6	30	2017	6	30	0	0	5	2,012	0,248	0,512	
26	Govedarci	Rooibos Tea	natural forest				4	GPA(G64)	2016	6	30	2017	6	30	0	0	5	1,915	0,248	0,642	

# Bio-ecological station “Balkanets”

Established for complex research in beech forests in Balkan Mt.

Located in the beech forest belt, falling into the catchment area of Zhalna river, a tributary of Beli Osam.

Representative forests of *Fagus sylvatica* are distributed on the northern slopes of Middle part of Balkan Mt.

Average altitude - 1200 m a.s.l.

Slopes - from 10° to 30°;

Dystric Cambisols;

Age 100-150 years

Average diameter 35-40 cm;

Average height 26 m;

Average stock 650-700 m<sup>3</sup>/ha;

(Raev, 2006)



# Bio-ecological station "Balkanets"



Included in the European network of research stations for long-term monitoring in forest ecosystems and landscapes of the European Union (ENFORS - COST E25) since 2003.

**Year:** 1971 -  
**Lat./Long.** 42°48' N; 24°38' E  
**Alt.** 850 - 1550 m a.s.l.  
**Area:** 950 ha  
**Forest:** G1.69 Moesian [Fagus] forests  
G3.1J [Picea abies] reforestation

# Bio-ecological station “Parangalitsa”

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*The catchment area of the Blagoevgradska Bistritsa River in Rila Mt.*

*Highly productive coniferous forests under the protection regime of Biosphere reserve “Parangalitsa”*

4 experimental sites in spruce, fir and Scots pine forests and dwarf pine communities, in the range 1400-2100 m a.s.l.

Studies on the dynamics of regeneration process, observations of succession processes at different ecological conditions.

The site is part of the UNECE ICP Forests Level 1 network, in accordance with which regular monitoring studies have been conducted in the period 1987 up to now.



Included in the European network of research stations for forest ecosystems' monitoring of the European Union (ENFORS - COST E25) since 2003.

# Bio-ecological station “Parangalitsa”

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Site “Parangalitsa” was proposed to be included as new site in the national LTER - network of Bulgaria, with the ambition to become a Master Site, under the Project LTER-BG - Distributed scientific infrastructure “Bulgarian Network for Long-Term Ecosystem Research”. The site is very promising for assessing forest ecosystems in the context of global climate change and for applying an integrated ecosystem approach in forest research.

Construction of modern research infrastructure for monitoring of forest ecosystems;

Integration of in-situ observations, monitoring of environmental components and analysis of the structure and functioning of ecosystems in relation to climate change and socio-environmental aspects;

Study of the dynamics in the spatial structure, growth and carbon balance of forests in the conditions of climate change;

Study of the elemental and material flows in the forest ecosystems in the conditions of climate change;

Biophysical assessment of the state of ecosystems and the ecosystem services they provide, based on a long-term database of specific indicators and modeling;  
Assessment of the changes in the quality of the habitats of rare and endangered species of flora and fauna in the conditions of future climate changes.



# Bio-ecological station “Gabra”

Established in 1973 in Ihtimanska Sredna Gora near  
of the village of Gabra;

Southern slope, 850-900 m a.s.l.

Experimental sites: (total 26)

(*Pinus silvestris* L.), (*Pinus nigra* Arn.) (*Quercus cerris*  
L.) (*Quercus frainetto* Ten.)

Grassland areas



# Bio-ecological station “Igralishte”



Established in 1970 in a tributary of Drakovska (Sedelska) river, Maleshevska Mt.  
Cover four small catchments with different vegetation cover and land use regime  
Watersheds 1 and 4 are mainly cutting-managed oak forests, pastures and arable land with 87 to 53% forest cover  
Watersheds 2 and 3 are almost entirely covered with Scots pine plantations

The area of catchments: 1 - 0.648 km<sup>2</sup>,  
2 - 0.135 km<sup>2</sup>, 3 - 0.075 km<sup>2</sup> and 4 - 0.551 km<sup>2</sup>.



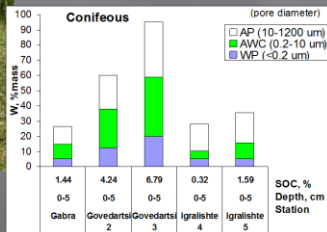
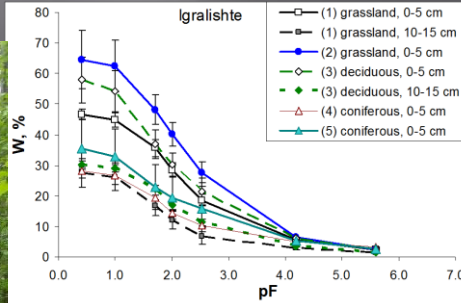
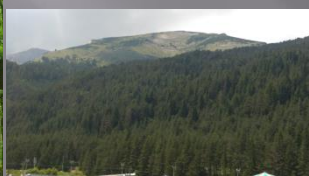
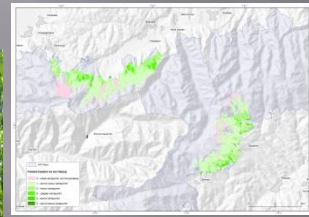
# Bio-ecological stations-FRI-BAS

"Thermal properties of soils at different land use and melioration"

NSF, MES - Institute of Soil Science, Agrotechnology and Plant Protection "N. Poushkarov" and Forest Research Institute-BAS

Tea Composition initiative  
Global litter decomposition study

PhD Theses







Thank you for your attention!