

# Calculations of Socio-Economic Efficiency of Environmental Forestry Measures including Reforestation Activities considering Climate Change and Forest Disasters in the Czech Republic

Ludek Sisak, Vilem Jarsky, Roman Dudik, Roman Sloup, Marcel Riedl  
Czech University of Life Sciences Prague, Faculty of Forestry and Wood Sciences

## Introduction

- ✓ The first experimental socio-economic efficiency evaluation of environmental forestry measures in the landscape under the Rural Development Programme (RDP) in the Czech Republic (CZE).
- ✓ Socio-economic efficiency based on relationships between inputs (forestry measures' costs) and outputs (improved forest services values), both expressed in pecuniary form.
- ✓ Based on forest services values differences to respective non-forest ecosystem services (Methodology by the Faculty of Forestry and Wood Sciences, certified by the Ministry of Agriculture in CZE).
- ✓ Assigned by the Ministry of Agriculture in 2017, based on environmental forestry measures' costs paid by the Ministry of Agriculture in CZE in 2015-2017.

## Methodology of the forest services' differentiated valuation by respective landscape ecosystem services

- ✓ **Market services – going through the market:**
  - Market timber production: by market revenues
  - Game keeping and hunting: by market revenues
- ✓ **Non-market services – influencing mediated market relations:**
  - Non Wood Forest Products: by shadow market revenues
  - Hydrological services (maximum and minimum runoffs, water quality): by costs of prevention approach
  - Soil protection services (soil erosion and deposits): by costs of compensation approach
  - Air protection CO<sub>2</sub> sequestration: by incomes from CO<sub>2</sub> permits trade
- ✓ **Non-market services – social, health-hygienic, nature protection):**

Valued generally by expert-appointed ratio of the forest services importance to the market timber production service in CZE:

  - Recreation, health: with local difference by forest frequentation
  - Nature protection (cultural, educative): with local difference by degree of naturalness, specially protected natural areas level

### Measure 1: Afforestation of non-wood lands (arable lands, grasslands and pastures substitutions)

Years	2015	2016	2017
Forest Services	Improved forest services values (thousand EUR)		
Timber production	-	-	-
Hydrological	1,214	1,642	1,619
Soil protection	93	126	124
Non-wood forest production	93	125	124
Air protection CO <sub>2</sub> sequestr.	71	95	94
Health-hygienic	229	310	305
Nature protection	238	322	317
<b>TOTAL</b>	<b>1,938</b>	<b>2,620</b>	<b>2,583</b>
<b>Costs paid</b>	<b>105</b>	<b>523</b>	<b>541</b>

### Measure 2: Forest lands reforestations after calamities

Years:	2016	2017
Forest services	Improved forest services values (thousand EUR)	
Timber production:	3,439	5,614
Hydrological:	264	431
Air protection-CO <sub>2</sub> sequestr.	441	720
Nature protection:	515	841
<b>TOTAL</b>	<b>4,659</b>	<b>7,606</b>
<b>Costs paid</b>	<b>1,903</b>	<b>3,042</b>

### Measure 3: Investments into soil-improving and stabilizing tree species

Years:	2016	2017
Forest services	Improved forest services values (thousand EUR)	
Nature protection	1,261	2,435
<b>Costs paid</b>	<b>160</b>	<b>791</b>

### Measure 4: Transformation of substitute forest stands in former immission areas into the standard ones

Years:	2016	2017
Forest services	Improved forest services values (thousand EUR)	
Timber production	3,060	12,248
Air protection CO <sub>2</sub> sequestr.	392	1,571
Nature protection	458	1,835
<b>TOTAL</b>	<b>3,910</b>	<b>15,654</b>
<b>Costs paid</b>	<b>1,035</b>	<b>4,188</b>

## Conclusion

- ✓ The first experimental valuation of the socio-economic efficiency of environmental forestry measures in the landscape.
- ✓ The findings received show it is possible to use the methodology for socio-economic efficiency calculations of the Rural Development Programme.
- ✓ The methodology and results will be used and verified by further studies.