ECONOMIC VALUATION OF FOREST GOODS AND SERVICES: THE PILOT STUDY IN BOLU REGION

Assoc. Prof. Bahar Celikkol Erbas, DePT. Of Economics
TOBB University of Economics And Technology
bcelikkol@etu.edu.tr
+90 312 292 4110

Natural Capital Accounting Regional Workshop for Europe and Central Asia (ECA) Region
Organized by
The World Bank and Turkish Ministry of Development,
March 9-11, 2015, Pera Palace Hotel, Istanbul, Turkey

OUTLINE

- Pilot Study Area
- Total Economic Value Concept
- Results - TEV Components Together
- Direct Use Values (Timber and Firewood Valuation, Non-Timber Forest Products (NTFP) Valuation, Recreation, Grazing, Hunting)
- Option Value (Pharmaceuticals)
- Indirect Use Values (Watershed Protection, Water Supply, Carbon Sequestration and Soil Erosion Control)
- Non Use Values (Existence and Bequest Value, Biodiversity)
- General Costs and Negative Externalities
- Conclusion
- Suggestions

PILOT STUDY AREA - BOLU REGIONAL DIRECTORATE OF FORESTRY

Republic of Turkey, DG Forestry, Regional Directorates

Source: DG Forestry Web Sites, Access date: January 21, 2015
http://www.ogm.gov.tr/sayfalar/ormanbolgemudurlukleri.asp

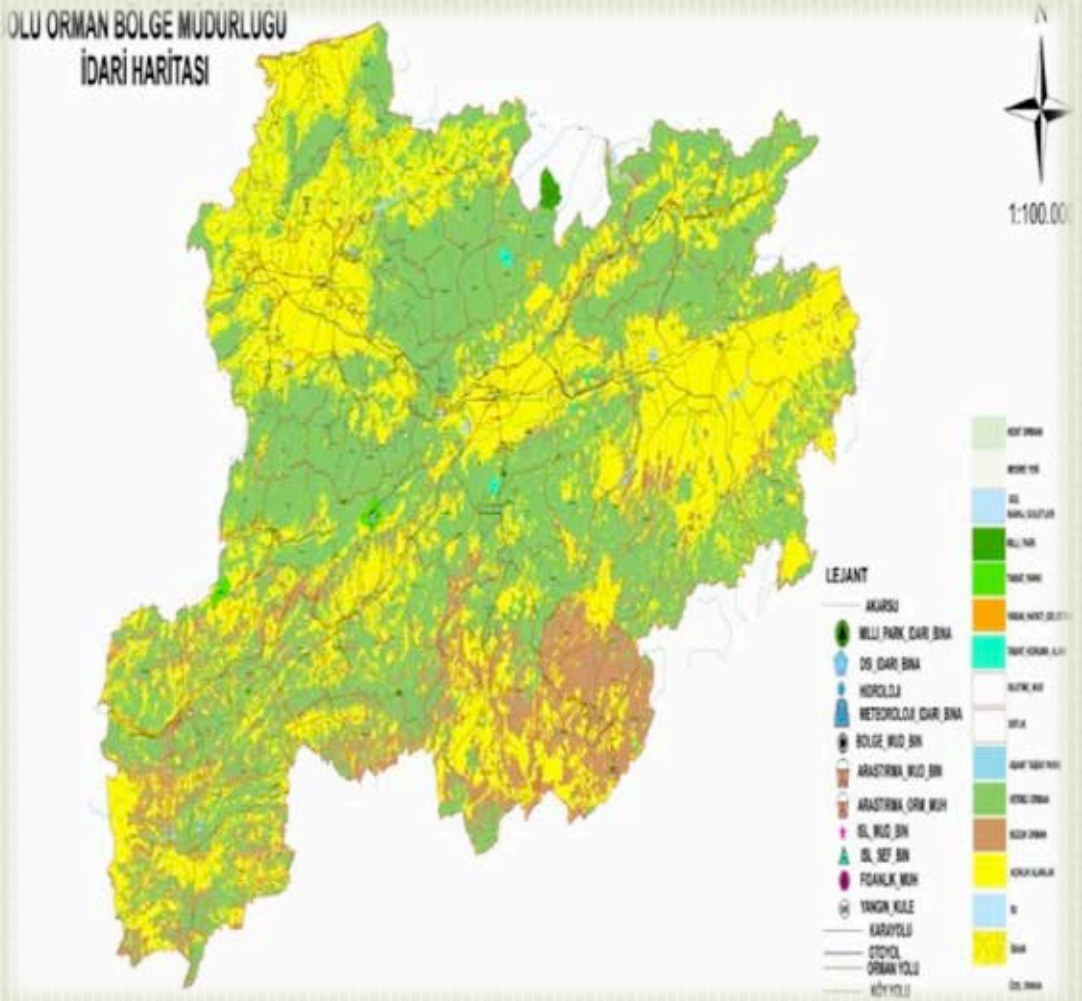
PILOT STUDY AREA - BOLU REGIONAL DIRECTORATE OF FORESTRY

- Area:1,037,166.2 ha
- Jurisdiction: Encapsulates Cities of Bolu and Düzce
- Population: 640,338
  - Population Density (person/km2): 34 (Bolu) and 139 (Düzce)
    - Compared to: Istanbul 2767 and Ankara 210
- Economy:
  - 11 among 81 cities in Turkey for Socio-Economic Development Measure
  - Agriculture 37.7%; Industry 21.6% (manufacturing, mining, utilities and construction)
  - 402 out of 487 village locates in or near forest, i.e. forest villages
- Ownership of Forests: State
- Administrative structure: State
- Main Stakeholders of Forest Resources: State and private forest owners, the general public, local people living in or near forests, related institutions, NGOs, Foundations, and Associations

Source: Bolu Regional DG Activity Report, pp. 5, 2012, http://boluobm.ogm.gov.tr/FaaliyetRaporu

PILOT STUDY AREA - BOLU REGIONAL DIRECTORATE OF FORESTRY

- Climate: Blacksea and Black Sea-Central Anatolia Transition Climate
- Topography: About 56% of Bolu is mountains some reaching the altitude of 2.499 m.
- Region has surface and ground water resources.
- Water Resources (surfaces): 997 ha
  - Natural Lakes : 478 ha
  - Dam Reservoirs: 131 ha
  - Manmade Small Lakes: 127 ha
  - Rivers: 260 ha
- Flora: 89 family, 363 kind, 771 variety 82 of them are the endemic plants of Turkey. (www.tubitak.gov.tr/tubives).
- Fauna: No data. However, in high regions bears, wildcat, roe-deer, deer, wolf and other wild life exists.
- National Parks (1-Yedigöller)
- Nature Parks (9 in Bolu)
- Wildlife Development Centers (6 in Bolu)

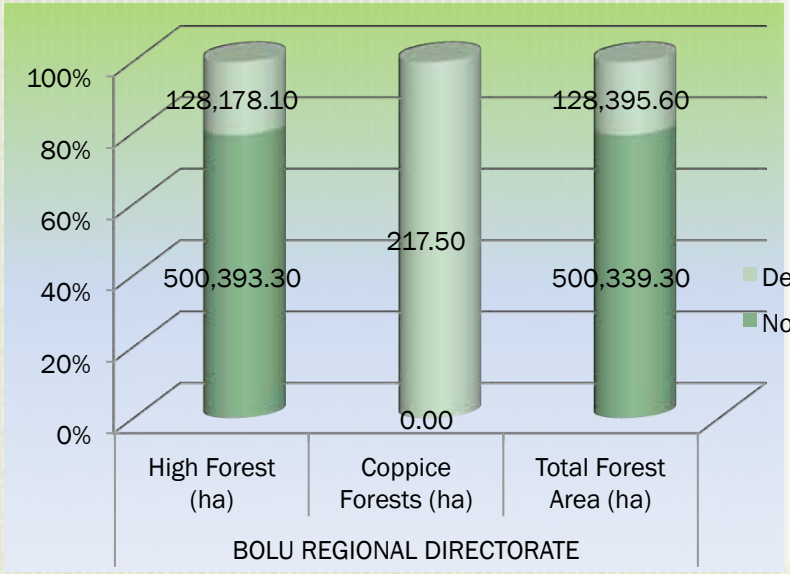


Source: Alper Tolga Arslan, Strategic Planning Unit Manager, Strategy Development Department DG Forestry

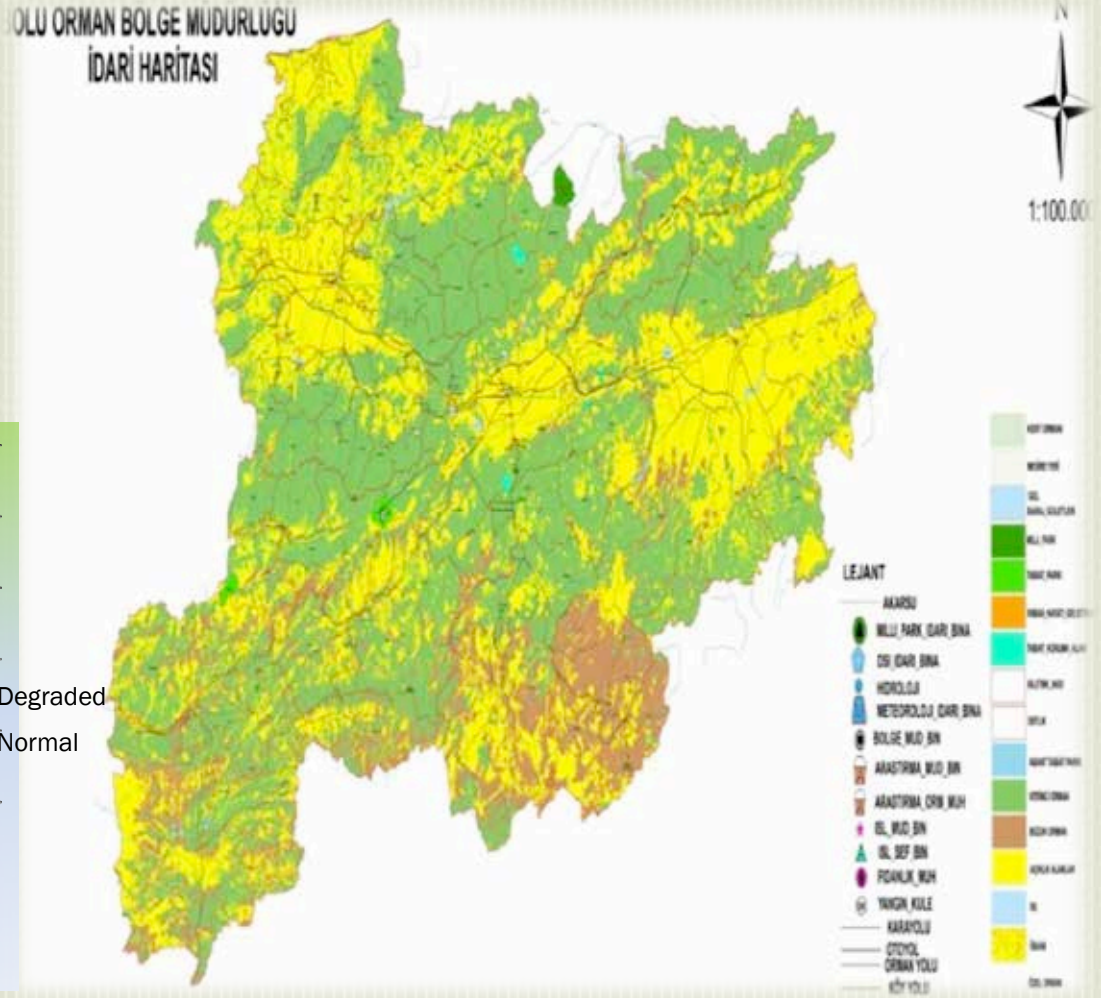
PILOT STUDY AREA - BOLU REGIONAL DIRECTORATE OF FORESTRY

- About 64% of Bolu and 50% of Düzce covered by forests.
- Total Forest Area: 628,734.9 ha
- Distribution of Forest Areas:
  - High Forests: 628,517 ha;
  - Coppice Forests: 217.5 ha;
  - Forest Soil: 88,079.7 ha

  - Broadleaved: 90,611.8 ha
  - Coniferous: 537,905.6 ha



Source: The Author



Source: Alper Tolga Arslan, Strategic Planning Unit Manager, Strategy Development Department DG Forestry

TOTAL ECONOMIC VALUE

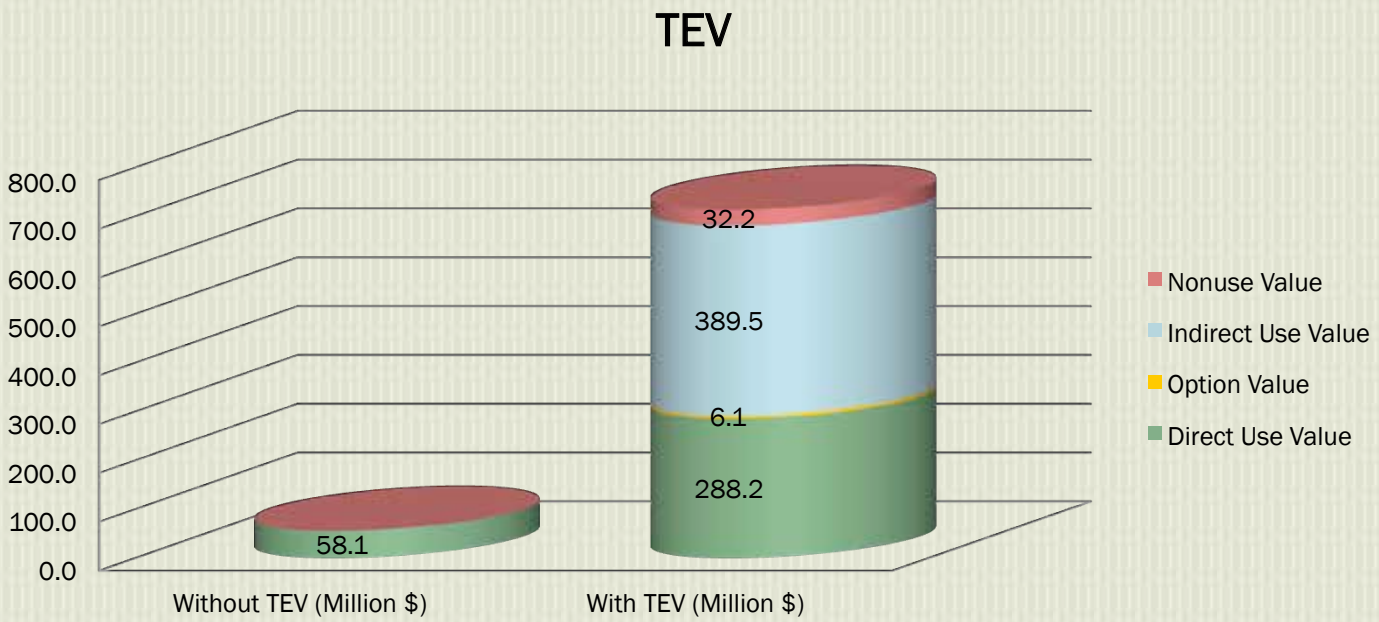
Source: Bolu Nature Turizm Development Plan 2013-2023, DG Forestry 2013

TOTAL ECONOMIC VALUE

Value Type	Products or Services	TEV - 2013 ($)	Valuation Method	Shares in TEV (%)
DIRECT USE VALUE	Timber	48,854,236.5	Market Price	6.8
	Firewood	8,133,671.0	Market Price	1.1
	Total NTFP-Plants	534,252.3	Market Price	0.1
	Honey	5,337,387.4	Market Price	0.7
	Recreation	12,020,272.3	Unit Value Transfer	1.7
	Fodder Value for Grazing	212,845,871.6	Market Price	29.7
	Hunting	469,631.4	Cost Based Valuation	0.1
	Total Direct Use Value	**288,195,322.3**		40.3
OPTION VALUE	Pharmaceutical	6,081,990.9	Unit Value Transfer	0.8
	Total Option Value	**6,081,990.9**		0.8
INDIRECT USE VALUE	Watershed Protection (Regulation of rainfall and water flow, water quality, reduction of overflow and floodding)	39,442,980.6	Adjusted Unit Value Transfer	5.5
	Water Supply	125,449,003.5	Adjusted Unit Value Transfer	17.5
	Carbon Sequestration	120,903,246.1	Standard Value Transfer (SCC)	16.9
	Soil Erosion Control (Nutirent Loss and Flooding)	103,744,813.9	Adjusted Unit Value Transfer	14.5
	Total Indirect Use Value	**389,540,044.1**		54.4
NONUSE VALUE	Biodiversity	19,247,591.4	Unit Value Use	2.7
	Existence and Bequest Value	12,906,437.4	Adjusted Unit Value Transfer	1.8
	Total Nonuse Value	**32,154,028.8**		4.5
	Total Value	**715,971,386.0**		100.0
General Costs and Negative Externalities	Expenditure related to Soil Conservation, Aforestation, Range Management, Rehabilitation of Degraded Coppices Forests	3,103,080.6	Actual Expenses	17.8
	Soil Erosion for Degraded Forests	13,992,820.3	Value Transfer	80.1
	Illicit Firewood Extraction	376,123.9	Cost Based Valuation	2.2
	Total Costs	**17.472.024,8**		100,0

Source: The Author

TOTAL ECONOMIC VALUE



Source: The Author

- TEV is $698,499,361.2 in 2013 for Bolu Regional Directorate.
- 0.08% of the GDP of the Country in 2013.
- 89.5% of TEV is not taken into account in GDP.

DIRECT USE VALUE

Source: Kuşulular Gündem-Simav

DIRECT USE VALUES

Value Type	Products or Services	TEV - 2013 ($)	Valuation Method
DIRECT USE VALUES	Timber	48,854,236.5	Market Price
	Firewood	8,133,671.0	Market Price
	Total NTFP-Plants	534,252.3	Market Price
	Honey	5,337,387.4	Market Price
	Recreation	12,020,272.3	Unit Value Transfer
	Fodder Value for Grazing	212,845,871.6	Market Price
	Hunting	469,631.4	Cost Based Valuation
	Total	288,195,322.5	

Source: The Author

DIRECT USE VALUES - I

- Timber and Firewood – Market Price
  - Production amounts, production costs, and prices are available from Forestry Statistics 2013.
    - Prices are averages of country level quarterly prices for the year.
    - There is also different sources ofr prices which reduced the value by small amount.
- NTFP – Plants - Market Price
  - DG Forestry (OGM) has monthly data on total sales and total revenue from for each NTFP in the region for the year 2013.
  - Price is obtained from the available data.
  - The data is collected by ad hoc field surveys managed by Mr. Özgür Balcı, Forest Engineer, Ecosystem Service Unit, DG Forestry.
  - Cost data, such as labor, associated with these extractions is not available.
  - Surveys need to include questions on cost related questions and prices and implemented systematically by following statistical procedures.

DIRECT USE VALUES - II

- Honey – Market Price
  - Data is available from different sources:
    - The production data is available from TUIK,
    - Number of active hives data is available from Turkish Honey Producers Association, and
    - Prices of honey were obtained from Animal Products Unit of DG Forestry
  - Honey produced from forests are assumed to be 85% of honey produced in the region.
  - Cost data from Bolu and Düzce Region was not available.
    - In stead, the data from Yalova region was obtained with a personal contact of Mr. İsmail Kurt, who provided the data from Yalova Honey Producers Association.

DIRECT USE VALUES - III

- Recreation Use Value - Unit Value Transfer
  - Literature: Four recreational value studies in Turkey have been found in the literature
    - Kaya et al. (1999) – Soğuksu National Park, Kızılcahamam, Ankara
    - Ortaçeşme, Özkan, Karagüzel (1999) – Kurşunlu Waterfall National Park, Antalya
    - Pak, M. and Türker M. F. (2001) – Sazalan Forest Recreational Site, Trabzon
    - Gürlük, S., Rehber, E., (2004) – Kuş Cenneti, Manyas Lake, A Ramsar Site, Bandırma, Balıkesir.
  - Study is Kaya et al. (1999)
    - calculates consumer surplus (CS) per person
    - for recreational use (daily trips for picnic, viewing and walking) of Soğuksu National Park, Kızılcahamam, Ankara.
  - Results:
    - The recreational use value is under estimated since
      - i. it does not include value of other recreational activities, over night stays in the areas, eco-tourism.
      - ii. probably demand is a lot higher for these areas since it is in between Istanbul and Ankara.
    - There is a strong need for studies for recreational value of forests in Turkey.

DIRECT USE VALUES - IV

- Fodder Value for Grazing - Market Price
  - The price data was obtained from the village, headman Mr. Abdullah Demirel, Kozyaka village, Seben, Bolu region.
  - To determine the economic value of fodder for grazing, typically, there is a need of:
    - the fodder production and consumption by animals in the forest
    - the number of animals that are herded in the forest every year
    - calculation of the contribution of forest to the annual intake of these animals,
    - Information on whether shepherds do also provide them with compound feed
  - Due to the lack of data, the valuation exercise carried by calculating the fodder production per area for each type of forest area. Certain coefficients are obtained from the Rural Development and Forestry Expert, Turgut Celikkol.
- Hunting - Cost based valuation
  - No WTP studies has been found for hunting
  - Hunters pay for their permit and for the fee for hunting
  - Except the specifically stated ones, the hunters are assumed to come from the region
  - Cost based methodology under estimates the value.

OPTION VALUE

Source: Bolu Nature Turizm Development Plan 2013-2023, DG Forestry 2013

OPTION VALUE

Value Type	Products or Services	TEV - 2013 ($)	Valuation Method
OPTION VALUE	Pharmaceutical	6,081,990.9	Unit Value Transfer

Source: The Author

- Pharmaceuticals - Unit Value Transfer
  - The option value of pharmaceuticals derived from forest genetic materials was estimated to be 5 Euro /ha for Turkey (Croitoru, 2007).

INDIRECT USE VALUES

Source: Bolu Nature Turizm Development Plan 2013-2023, DG Forestry 2013

INDIRECT USE VALUES

Value Type	Products or Services	TEV - 2013 ($)	Valuation Method
INDIRECT USE VALUES	Watershed Protection (Regulation of rainfall and water flow, water quality, reduction of overflow and flodding)	39,442,980.6	Adjusted Unit Value Transfer
	Water Supply	125,449,003.5	Adjusted Unit Value Transfer
	Carbon Sequestration	120,903,246.1	Standard Value Use (SCC)
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	Total Value	389,540,044.1	

Source: The Author

INDIRECT USE VALUES

- Watershed Protection - Adjusted Unit Value Transfer
  - The watershed protection value estimated for Syria, Greece and Italy range within 45-150 Euros/ha (Croitoru, 2007).
  - Watershed protection include regulation of rainfall and water flow, water quality, reduction of overflow and flodding
- Water Supply - Adjusted Unit Value
  - Unit value is taken from Nunez, Nahuelhual, and Oyarzun (2006).
  - The study area is Chile's temperate forests which is similar to the project area (the pilot area) forests.
  - The unit value is the weighted average of values for two different periods.
  - CPI data from TUIK is used to carry the unit value from early years to 2013.
  - The unit values are adjusted for income, PPP, and time.

INDIRECT USE VALUES

- Carbon Sequestration – Standard Value (Social Cost of Carbon)
- The amount of carbon sequestrated in forest increments in 2013 by following the methodology and data provided in Karabıyık (2014).
  - The net forest increments in ton,
  - Roots left in the forest (LULUCF coefficient of 0.19 is used in preparing Turkish GHG inventory (Karabıyık, 2014),
  - Wood for carbon storage,
  - The above ground biomass based on the expansion factor calculated by Prof. Ünal Asan, Istanbul University, Forestry Department.
    - This value is used in the Country reports to UNFCCC.
  - Below ground biomass,
  - Carbon for broadleaved and coniferous types of forests
  - Cabon content of biomass is based on AFOLU, IPCC 2006.
- The data on the forest increments, wood production, firewood, illicit firewood, are available from DG Forestry.
- Social Cost of Carbon (SCC) is the average value of SCC per ton=49 Euro (European Forest Institute, 2014)
- Since carbon sequestration benefits are exercised by the World, i.e. it is a global public good, this value does not need to be adjusted.

INDIRECT USE VALUES

- Soil Conservation - Unit Value Transfer
  - Unit value of soil erosion is the specific value calculated for Turkey and taken from Bann (1998b).
    - This value was evaluated by replacement cost of nutrients and flood damages.
  - Degraded forests of the region were not included in the total forest area calculated which eliminates erosion.
    - Areas where reforestation, range management, forest rehabilitation, and soil conservation activities were done are added to normal forest area.
  - It does not include sediment removal costs and thus under estimated the foregone costs, i.e. the benefits.
  - It is possible to estimate quantity of soil erosion in the pilot region as well as different regions with varying ecosystems.
    - These types of studies are necessary to come up with more reliable measure of the benefits from soil erosion control function of forests.

NONUSE VALUES

Source: Bolu Nature Turizm Development Plan 2013-2023, DG Forestry 2013

NONUSE VALUES

Value Type	Products or Services	TEV - 2013 ($)	Valuation Method
NONUSE VALUES	Biodiversity	19,247,591.4	Unit Value Use
	Existence and Bequest value	12,906,437.4	Adjusted Unit Value Transfer
	Total	32,154,028.8	

Source: Bolu Nature Turizm Development Plan 2013-2023, DG Forestry 2013

- Biodiversity – Unit Value Use
  - Marginal WTP specific to Turkey was calculated by meta-analysis in Viladimir (2014).
  - The forest areas designated for conservation is obtained from DG Forestry.
- Existence and Bequest Value - Unit Value Transfer
  - The average WTP in 1999 from the study by Walsh, Loomis and Gilliman (1999).
  - The area subject to valuation is the total areas of wild life developments.
  - Assumption: Other forest areas are also the source of wildlife.

COSTS AND NEGATIVE EXTERNALITIES

Source: Bolu Nature Turizm Development Plan 2013-2023, DG Forestry 2013

COSTS AND NEGATIVE EXTERNALITIES

Value Type	Products or Services	TEV - 2013 ($)	Valuation Method
General Costs and Negative Externalities	Expenditure related to Soil Conservation, Aforestation, Range Management, Rehabilitation of Degraded Coppices Forests	3,103,080.6	Actual Expenses
	Soil Erosion from Degrated Forests (Nutirent Loss and Flooding)	13,992,820.3	Unit Value Transfer
	Illicit Firewood Extraction	376,123.9	Market Price
	Total Value	17,472,024.8	

Source: The Author

- Costs and negative Externalities are taken into account in calculating TEV.
- Expenditure related to Soil Conservation, Aforestation, Range Management, Rehabilitation of Degraded Coppices Forests are provided by DG Forestry.
- Soil erosion from degraded forest land is computed by using unit value transfer. However, this cost only includes nutrient loos and flooding and excludes sedimentation removal.
- Illicit firewood extraction is valued by using market price of firewood.

CONCLUSION

Source: Bolu Nature Turizm Development Plan 2013-2023, DG Forestry 2013

CONCLUSION

- The pilot study is based on already available data.
- Valuation methods developed in environmental economics (Figure 1).
- Institutional set up and human capital for valuation
  - Bigger portion of TEV is from ecosystem services, yet almost no studies

Fig.1. Methods	Observed Behavior	Hypothetical
Direct	Market Price	Contingent Valuation
	Simulated Markets	
Indirect	Travel Cost	Attribute-based Models
	Hedonic Property Values	Conjoint Analysis
	Hedonic Wage Values	Choice Experiments
	Avoidance Expenditures	Contingent Ranking

Source: The Author

SUGGESTIONS

- Economic valuation infrastructure is necessary.
- Starting points:
  - Economic valuation data map
  - Coordination amongst several institutions on data collection and gathering
  - Direct use value categories – economic data is missing or not well organized or recorded
  - Indirect use categories – Data on both physical and economic amounts are missing.
  - Use of correct economic terminology.

SUGGESTIONS

- Use of research infrastructure of DG forestry
  - The guideline for forestry valuation
  - Regional directorates of Forestry Research Institute
  - Projects to conduct valuation analysis
    - What is the mount of honey produced in each forest types per hectar per year?
    - What is the amount of ground and surface water that forest resources in a particular region capture from rainfall?
    - How much soil is eroded from degraded or other land forms?
  - Aggregation of the results for the national level.
- Sustainable use of forests - integrated and participatory management of these resource.

THANK YOU

Source: Bolu Nature Turizm Development Plan 2013-2023, DG Forestry 2013