

**Niss(i)ology and Utopia: back to the roots of Island Studies**  
**Mytilene, May 23-27, 2016**

An integrated framework for decision support in islands' management: a case-study for Samos island in the Aegean, Eastern Mediterranean

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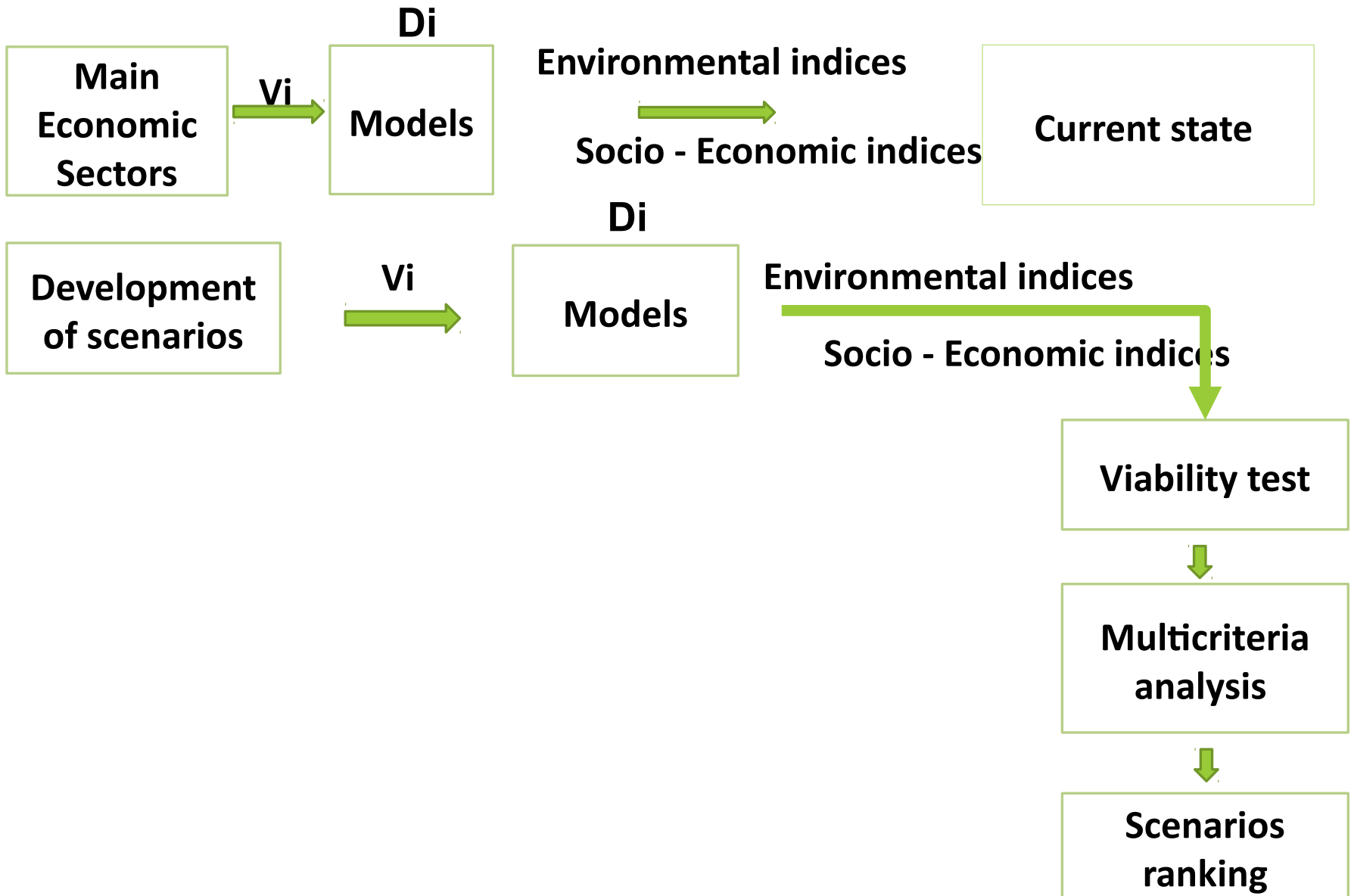
**\*\* Dept of Environment, School of the Environment, University of the Aegean**

# Aims and Objectives

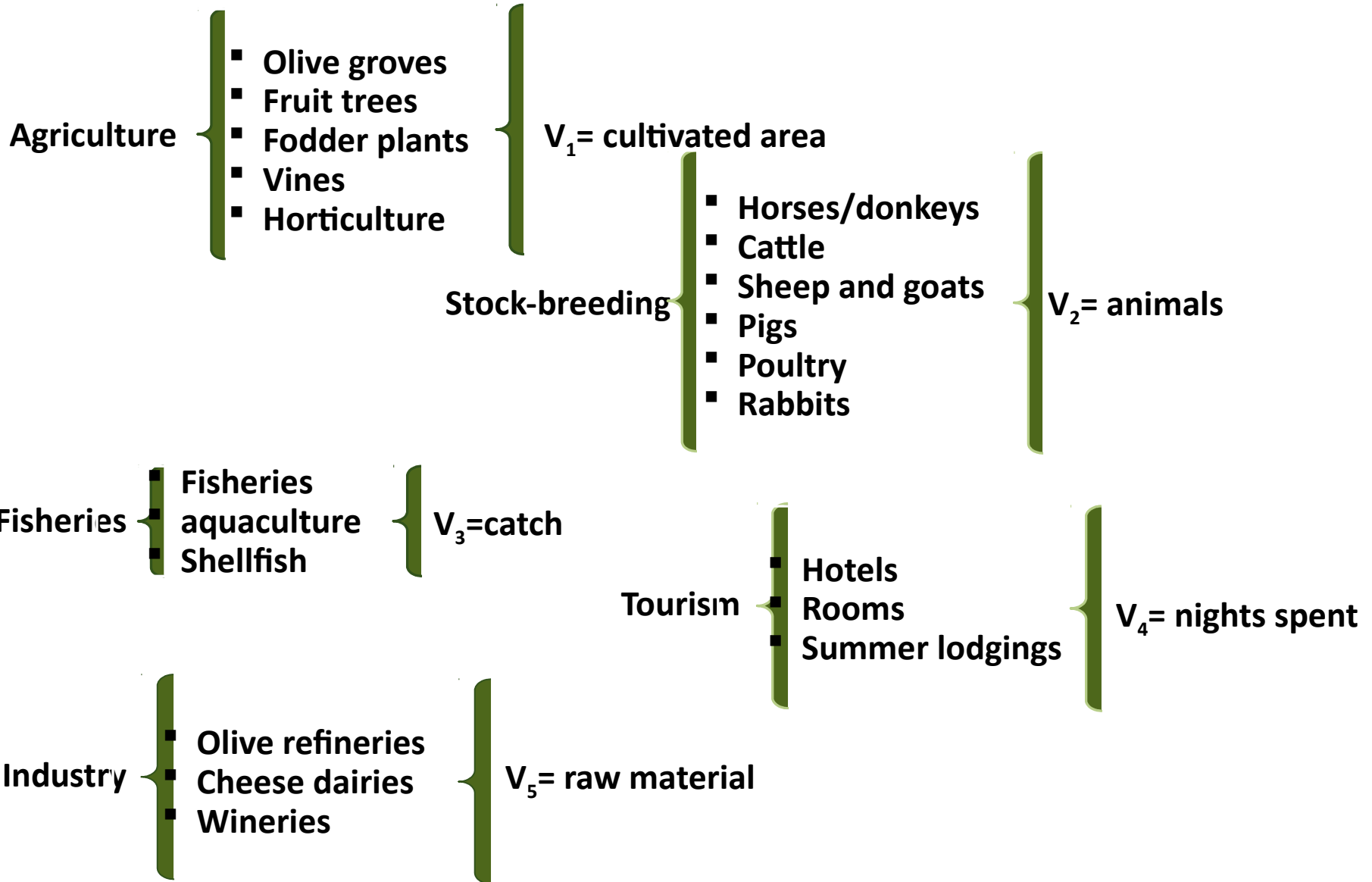
- Approach of an island as a complex dynamic system with natural, economic and social components
  - Simulation of the system using a mathematical model for the reproduction of the current state and testing of future evolution
  - Investigation of stakeholders' views through questionnaires
  - Scenarios' ranking with multicriteria analysis
  
- Implementation in the Aegean, island of Samos
  
  
- Final goal: The development of a Decision Support System (DSS) to be used for sustainable use of resources, economic growth and human well - being



# DSS flow diagram



# Sectors and Subsectors



# Indices for the assessment of (a) environmental pressures and impacts, (b) economic growth and (c) social welfare

## Environmental

- Water consumption
- Energy consumption
- N loading
- P loading
- Biodiversity loss

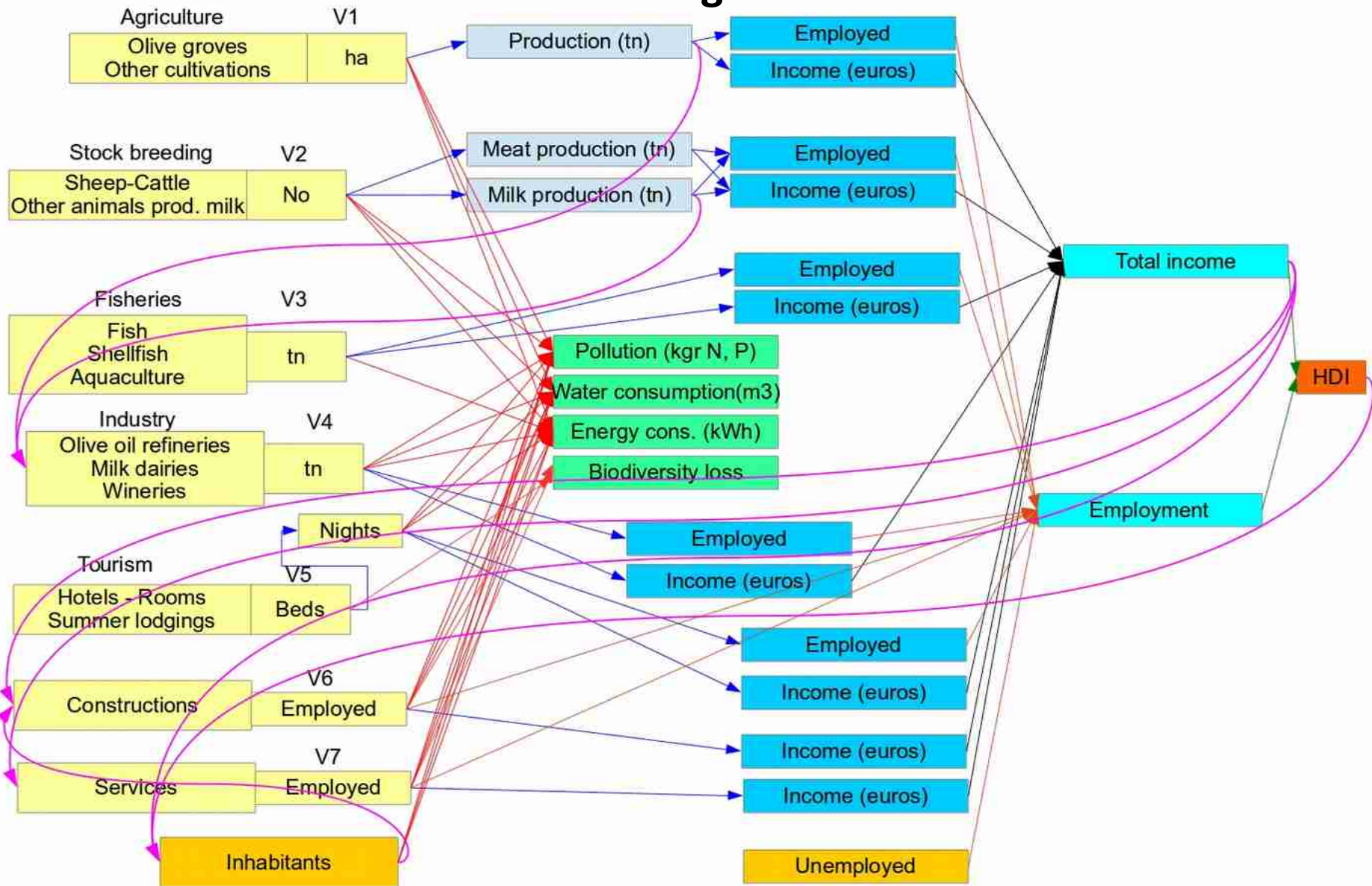
## Economic

- Employment
- Income

## Social

- HDI (Human Development Index)

# Flow diagram

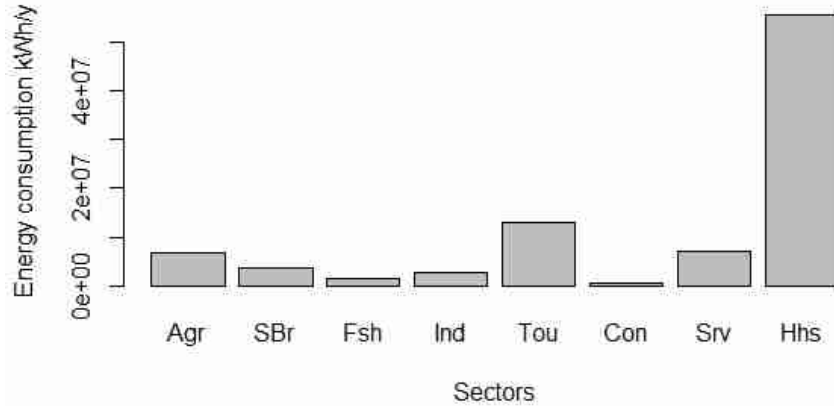


# Current state of Samos

## Environmental indices

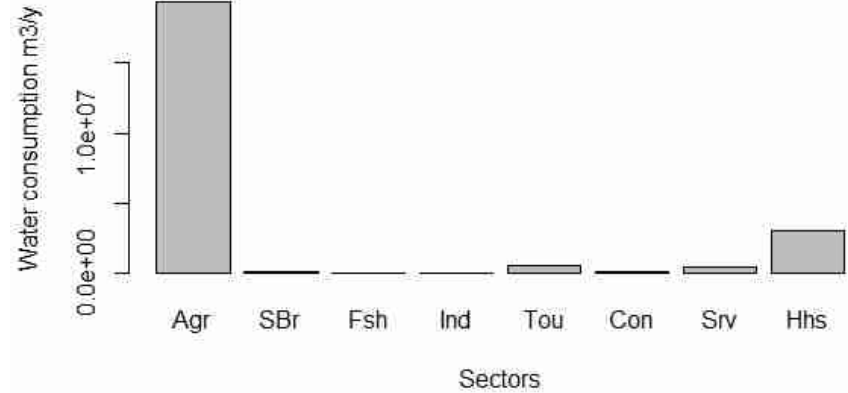
90682.029 Mwh  
model

99372 Mwh  
[www.rae.gr](http://www.rae.gr)



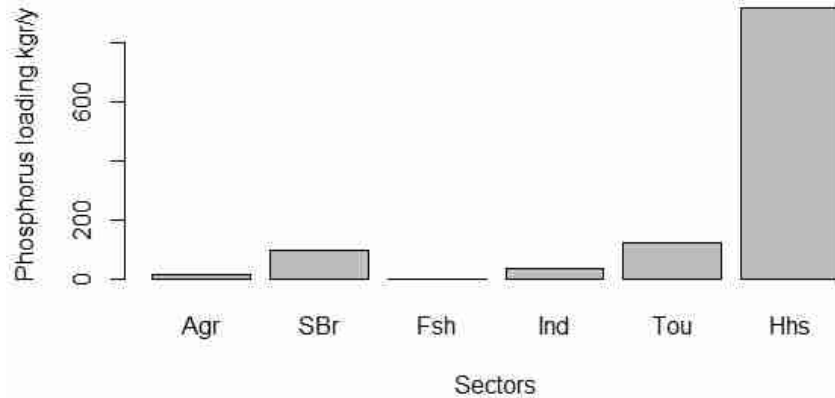
Water consumption in  
agriculture 82%  
model

Water consumption in  
agriculture 64%  
<http://wfd.ypeka.gr/>



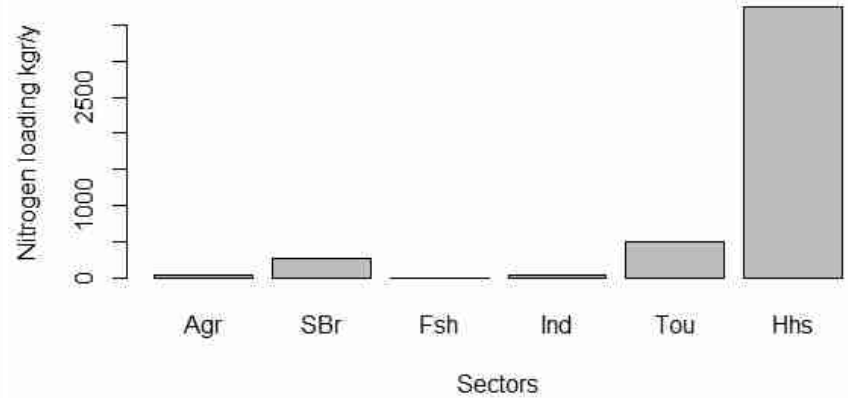
15.17  
model

22.68  
<http://wfd.ypeka.gr/>



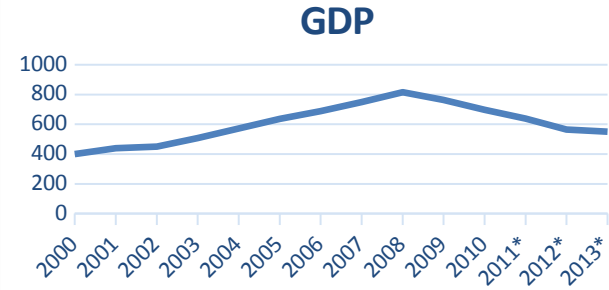
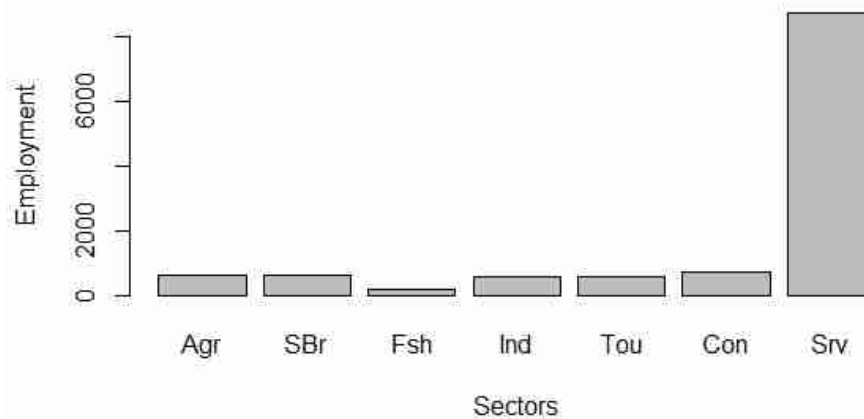
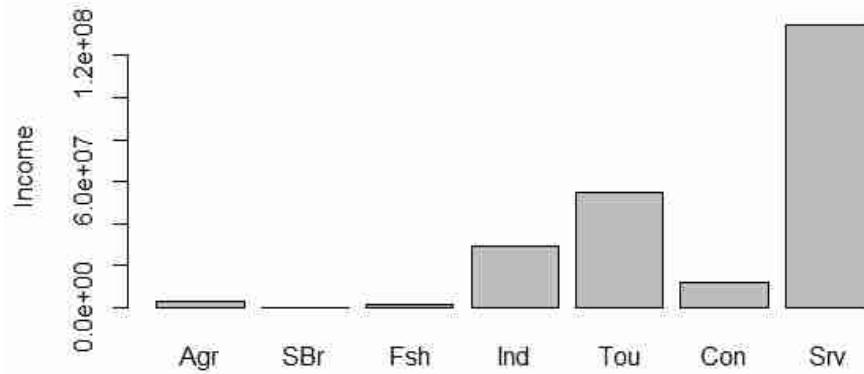
48.12  
Model

46.09  
<http://wfd.ypeka.gr/>



# Current state of Samos

## Economic indices



234.753.365.3 euro  
Model

Ετοσ  
565.000.000 euro  
[www.statistics.gr](http://www.statistics.gr)

Human Development Index =

**0.793**



## **Development of scenarios through:**

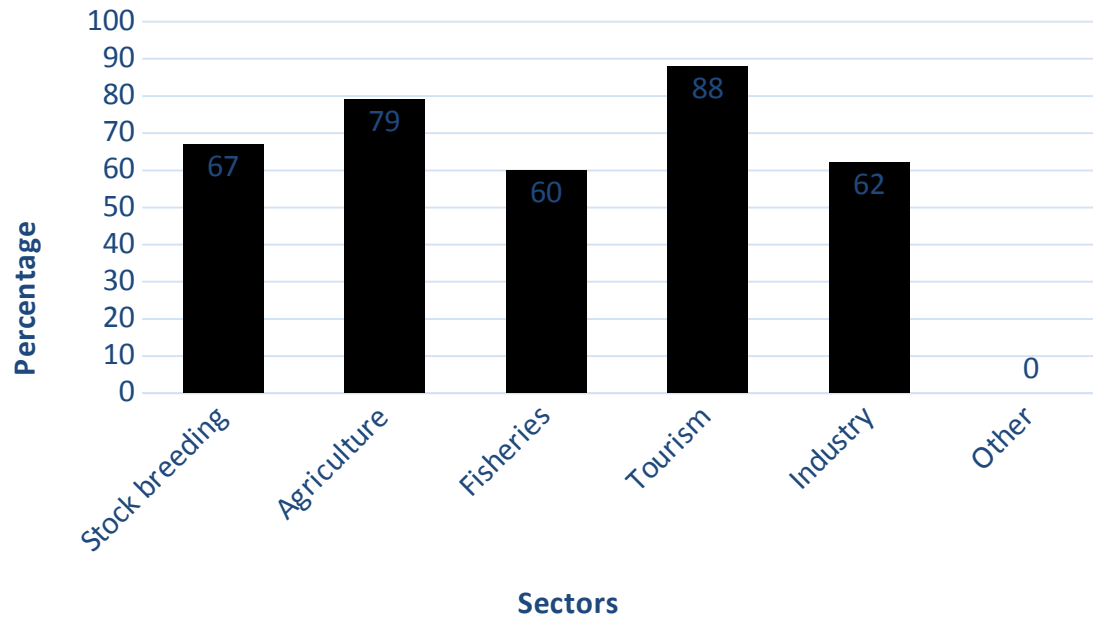
- % changes (annual increase or decrease) in characteristic variables ( $V_i$ ) of economic sectors (agriculture, stock-breeding, fisheries, tourism)**
- % changes in coefficients (e.g. per capita water or energy consumption, salaries)**
- Combinations of the above**
- Changes in Industrial activity, Constructions, Services and Population are calculated through feedback mechanisms (e.g. Industrial activity depends on agricultural and stock-breeding raw products, population growth depends on the trends of economic growth and social welfare)**

## Three evolution scenarios

- ❑ **1<sup>th</sup> Scenario: Business As Usual (BAU)**  
Expresses current trends in the study area
  
- ❑ **2<sup>nd</sup> Scenario: Policy Targeted (PT)**  
Emphasis on economic growth, paying less attention on environmental protection
  
- ❑ **3<sup>rd</sup> Scenario: Deep Green (DG)**  
Emphasis on environmental-friendly economic development

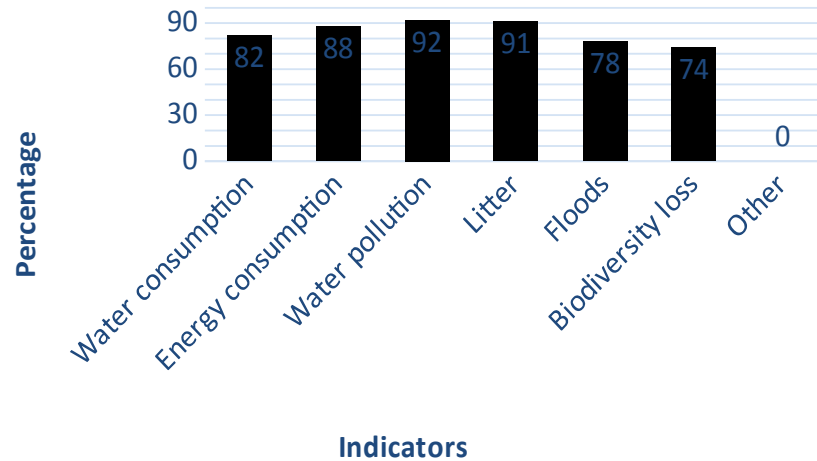
# Stakeholders' views

## Preference in sectors' development

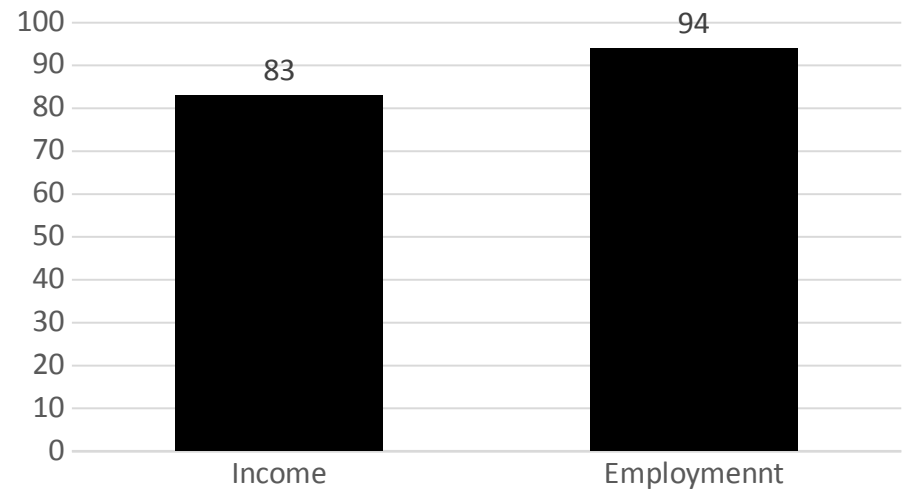


# Stakeholders' views

## Importance of Environmental Quality Indicators



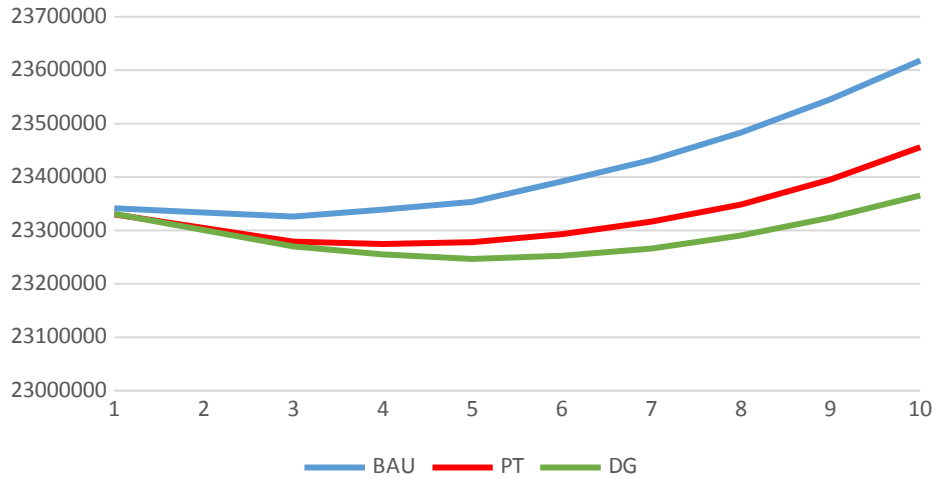
## Importance of Economic Indicators



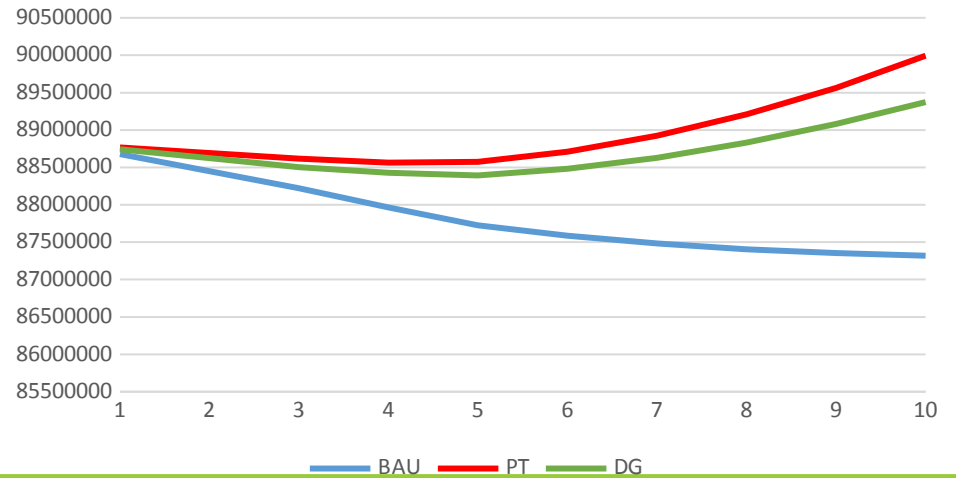
# Results of scenarios

## Environmental indices

### Water consumption

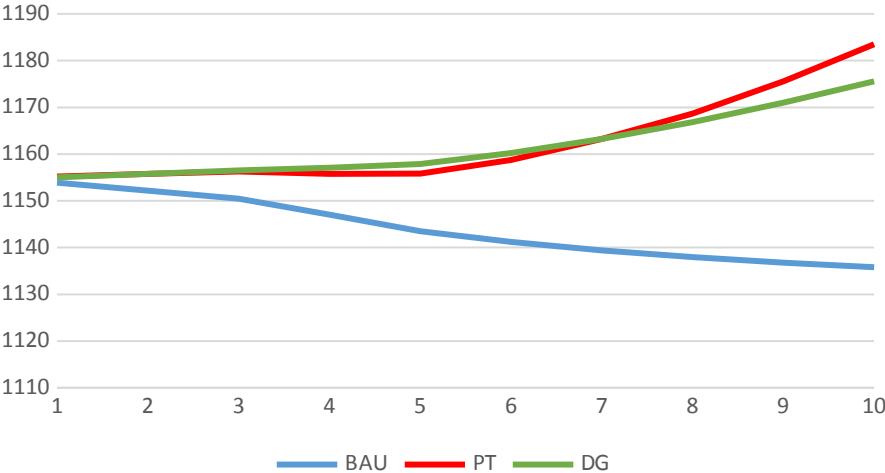


### Energy consumption

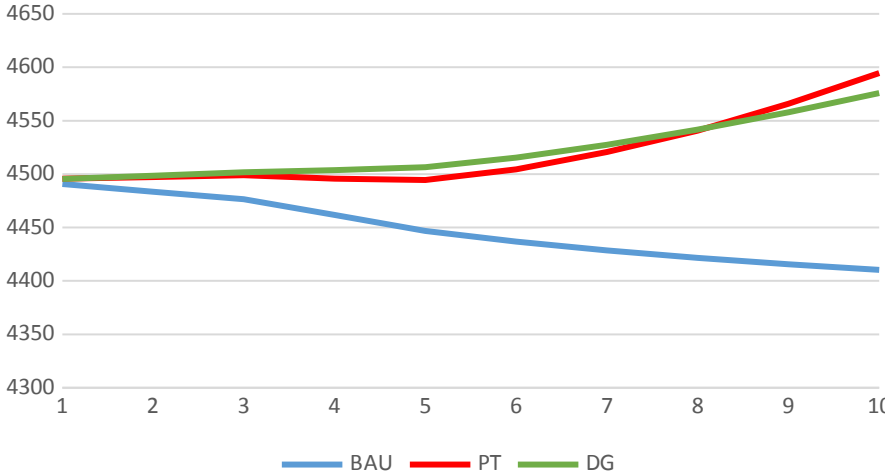


# Environmental indices

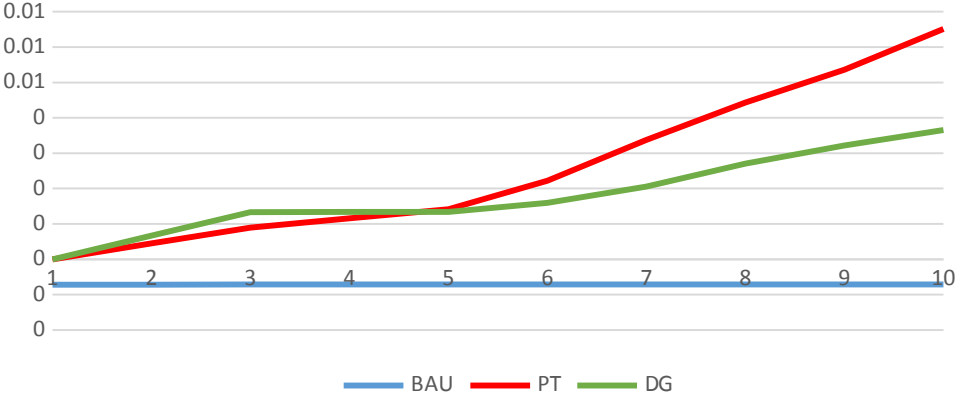
### P loading



### N loading

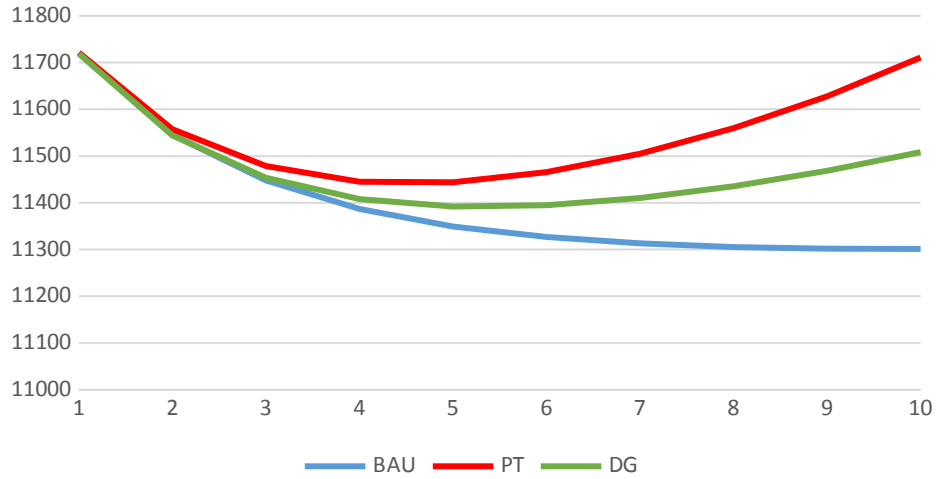


### Biodiversity loss

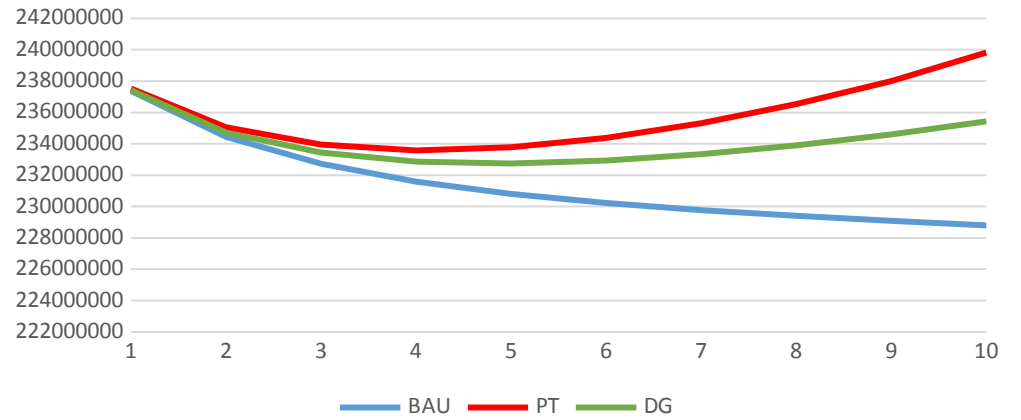


# Economic indices

## Employment

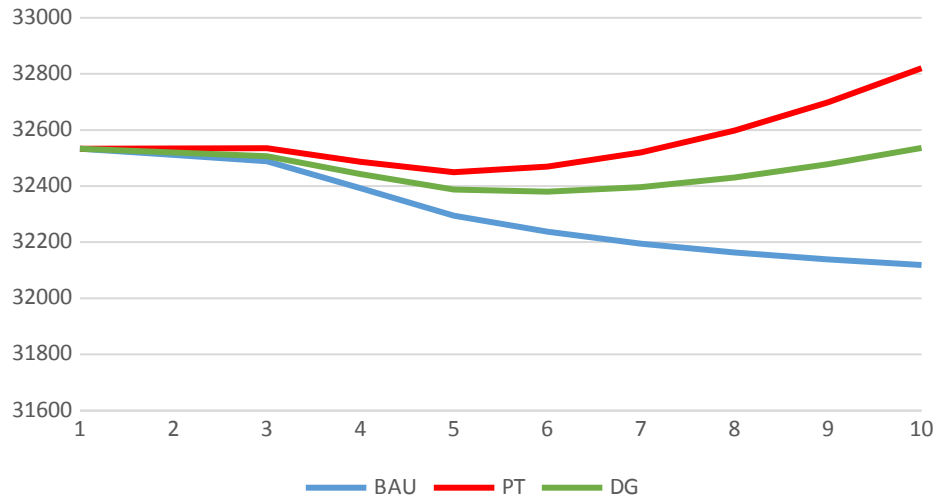


## Income

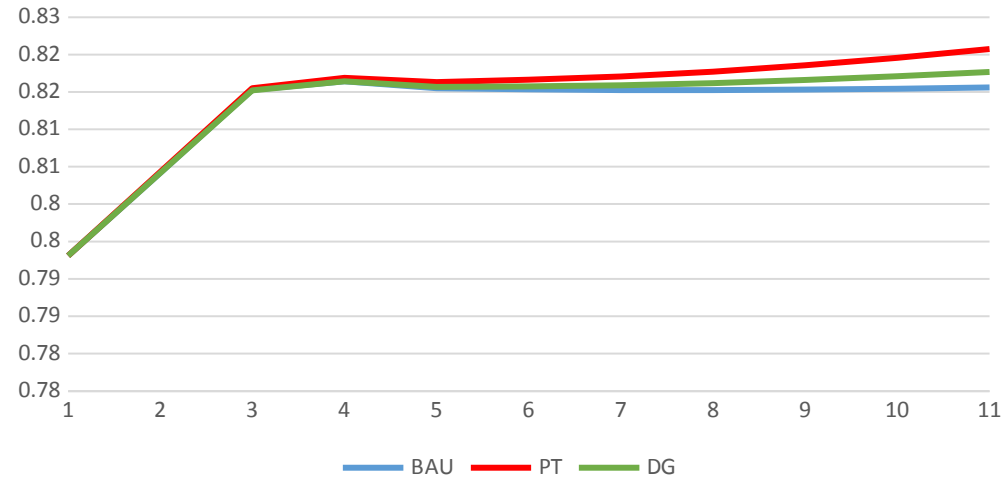


# Economic and social indices

## Population



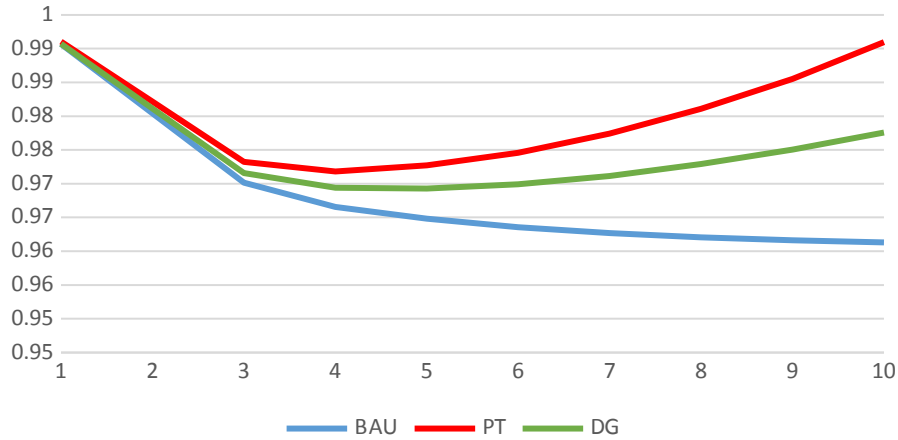
## HDI



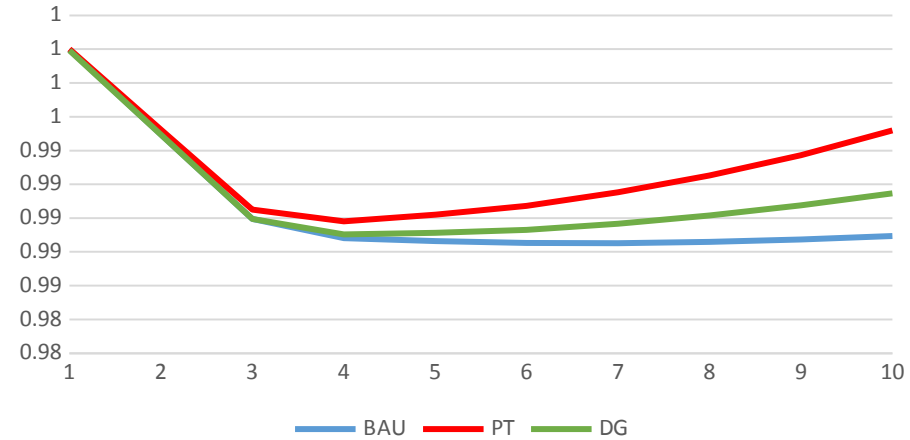


# Results of Multicriteria Analysis

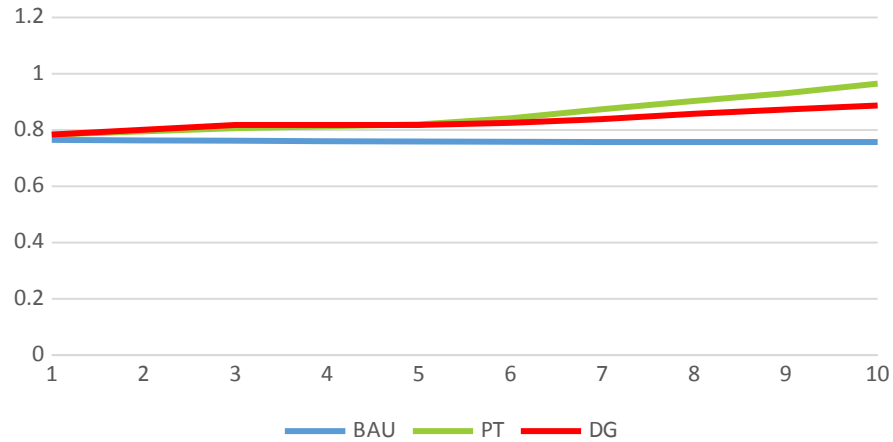
## Economic



## Social

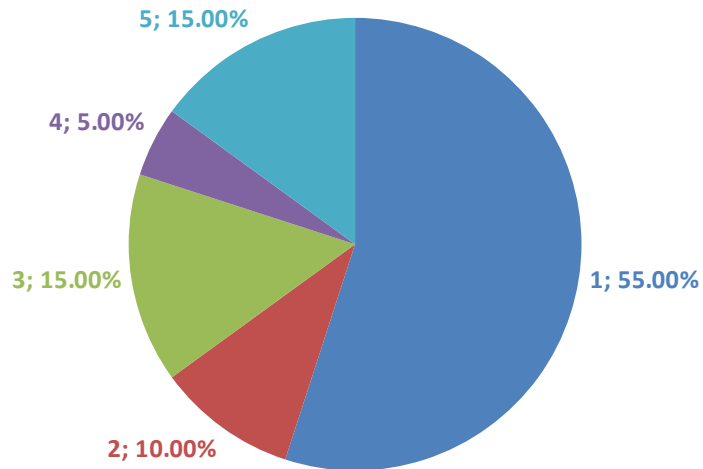


## Environmental

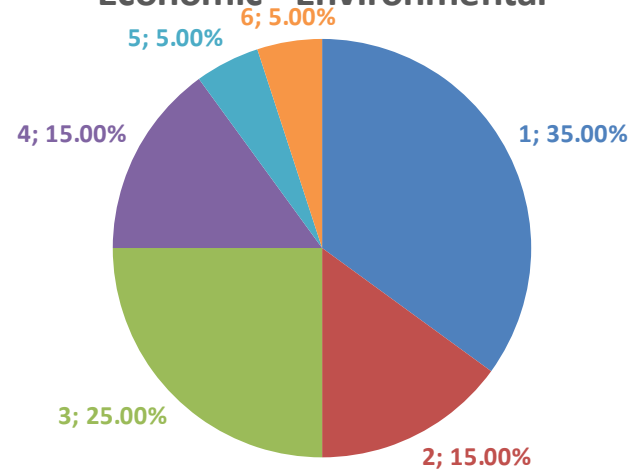


# Stakeholders views

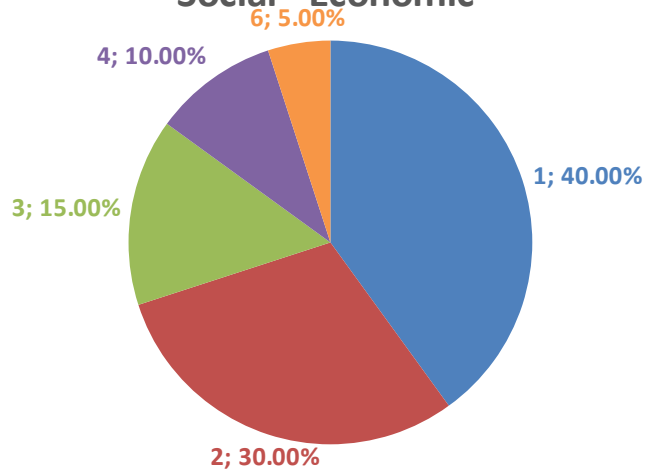
## Environmental - social



## Economic - Environmental

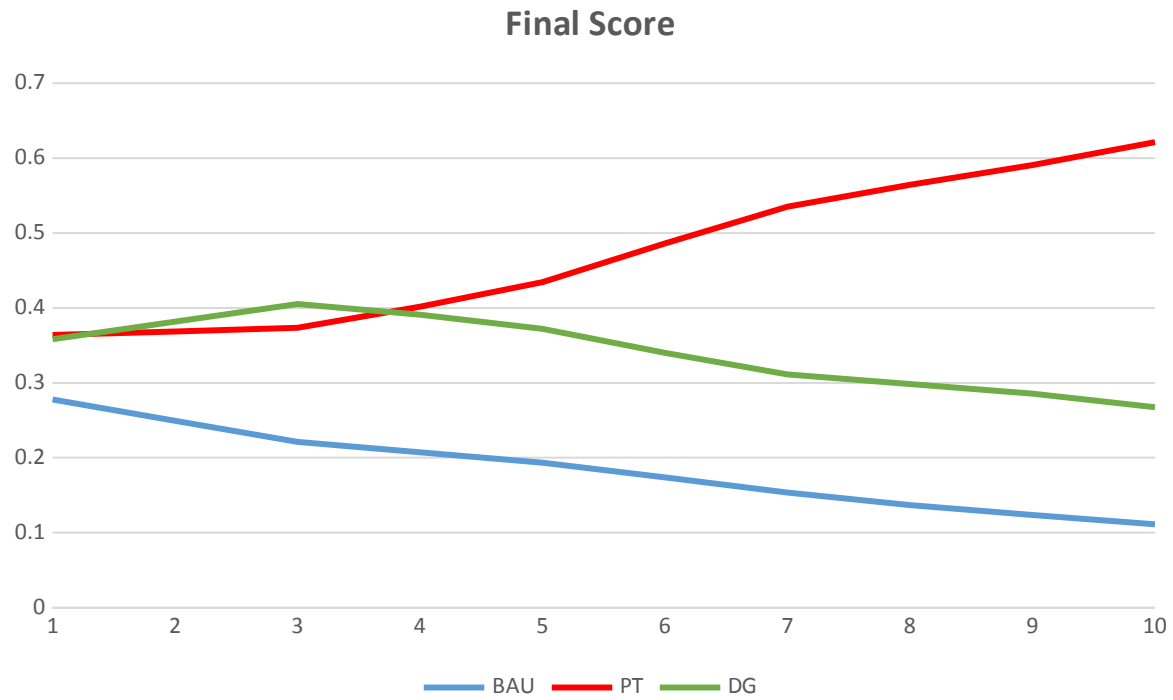


## Social - Economic



1. Equally important
2. Slightly more important
3. Strongly more important
4. Very strongly more important
5. Absolutely more important
6. Slightly less important
7. Strongly less important
8. Very strongly less important
9. Absolutely less important

# Final ranking of scenarios



# Conclusions

- ❑ The proposed model is able to reproduce the current state of the environmental and socio – economic components of an island (or coastal area) and can be used for decision support in integrated management
- ❑ Stakeholders views can be incorporated into the model through questionnaires' analysis
- ❑ Services and Tourism are the main economic sectors for the Samos island, whereas Households are the main origin of environmental pressures
- ❑ According to stakeholders' views tourism and agriculture must be developed in the future and economic growth is the main priority
- ❑ Future considerations:
  - sensitivity and uncertainty analysis of the proposed modeling tool
  - possible inclusion of spatial components
  - assessment of island's carrying capacity