Sustainable Coastal Management Strategies for the South Baltic Sea: A Bayesian Network-Based Analysis of Key Factors and Solutions

Kelpšaitė-Rimkienė, L., Baltranaitė, E., Šakurova, I. & Kondrat, V.

Loreta.kelpsaite-rimkiene@ku.lt

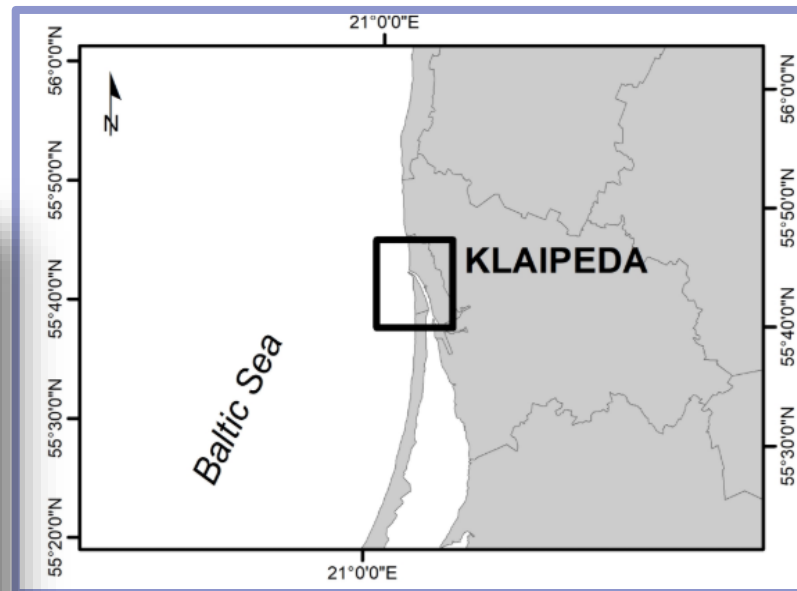Marine Research Institute, Klaipėda University, Lithuania

INTRODUCTION

Lithuania, © T.Ruginis

Poland, © LKR

South Baltic Region (© E. Jurkus [12]);

Sweeden © G.Kazelskis

© www.portofklaipeda.lt

Latvija, © LKR

AIM OF STUDY

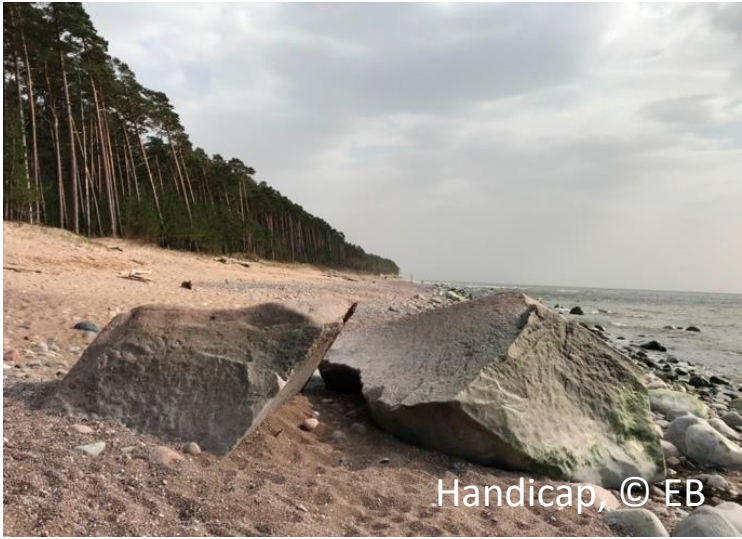6 July 2014

KLAIPEDA

Baltic Sea

20 January 2016

To identify and substantiate significant physical geographical factors impacting the sustainability of South Baltic coastal resorts by applying Bayesian Networks, relying on the study area's socioeconomic and long-term observation data.

South Baltic Region (© E. Jurkus [12]);

STUDY AREA:
SANDY COASTS OF KLAIPEDA

Melnaragė I, © VK

Handicap, © EB

Melnaragė II, © EB

Smiltinė, © EB

Girulių

Handicap

Melnragės II

Melnragės I

Klaipėda coastal weather station

Smiltynės I

Klaipėda

Baltic Sea

Smiltynės II

Legend

• Name of a locality

Klaipėda City Municipality

0 0,5 1   2   3   4
                         Km

N

METHODS

Basic steps of the Bayesian analysis:

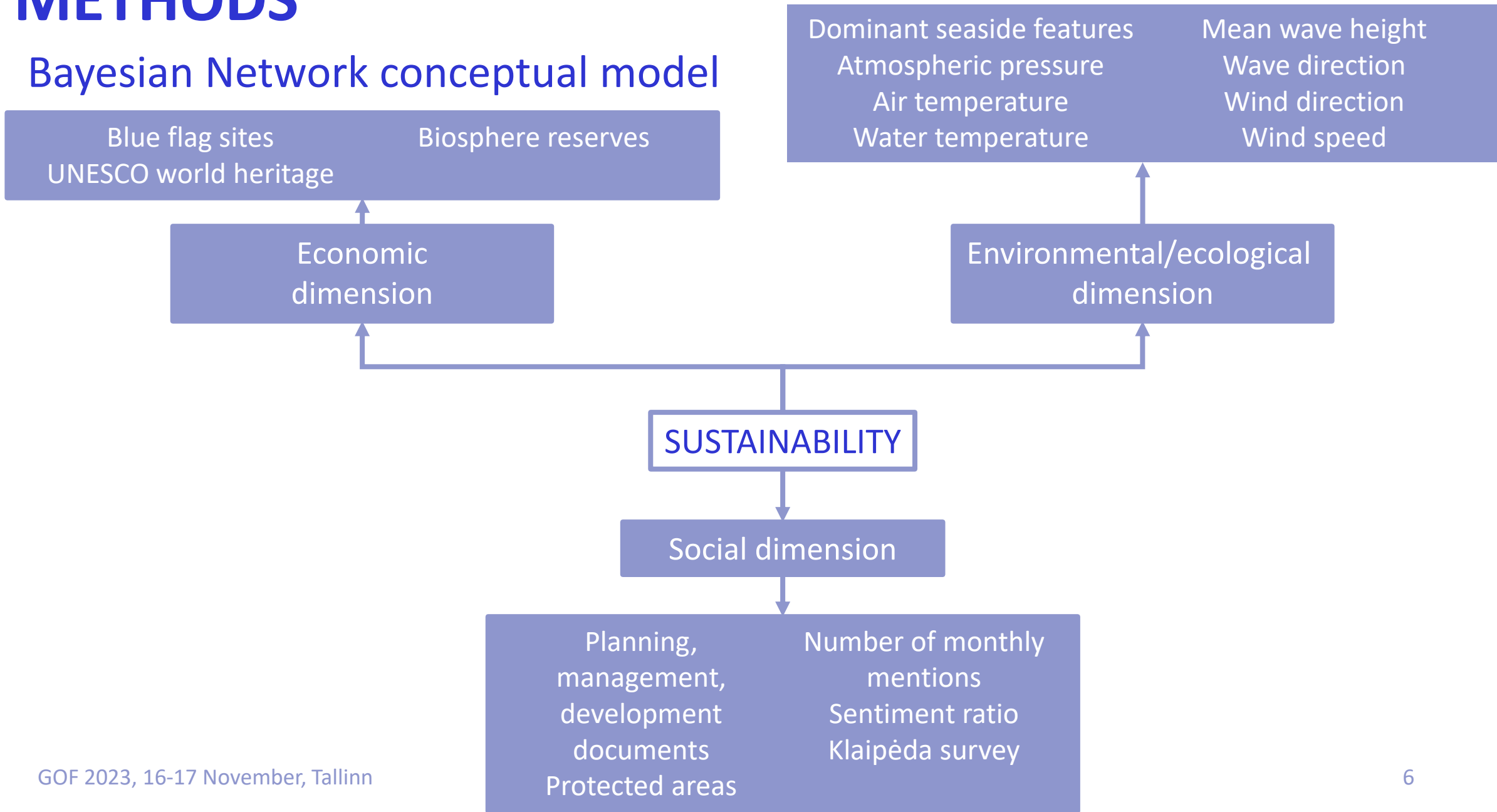Quantifying current beliefs via a prior distribution;

Quantifying information provided by new data via the likelihood;

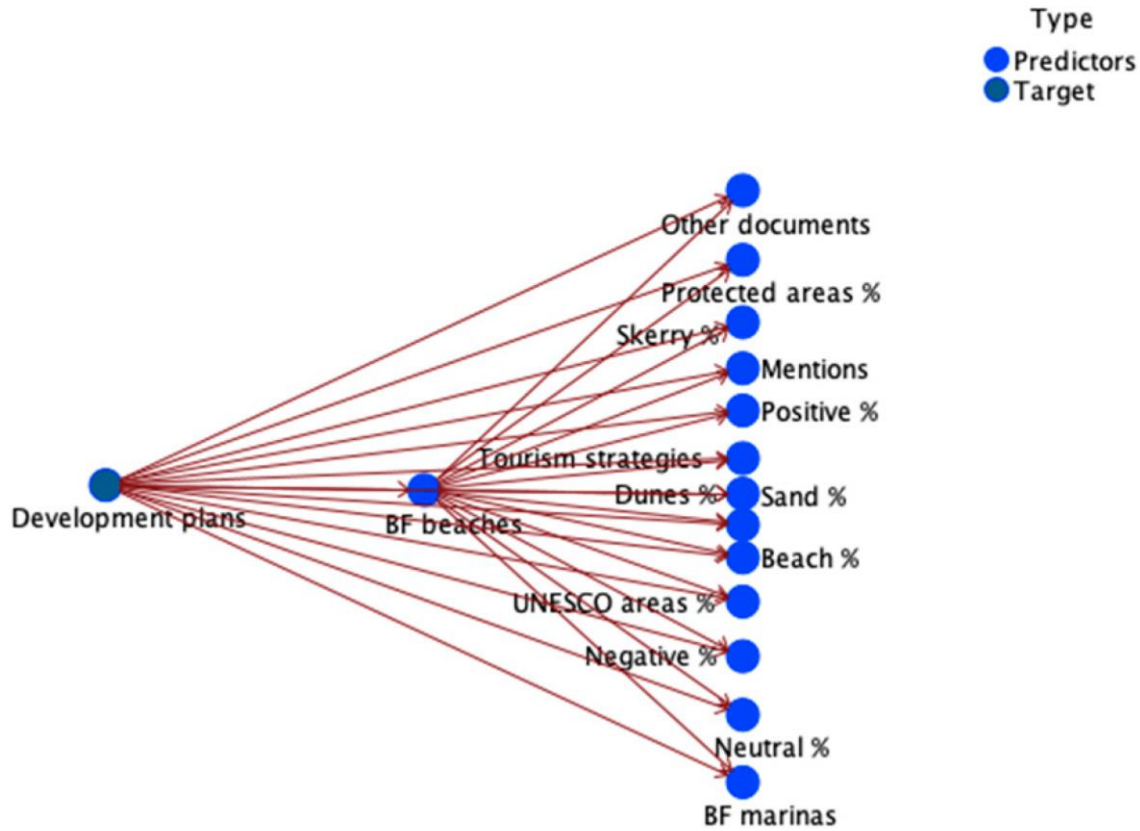Using Bayes' Theorem to update beliefs and form the posterior distribution
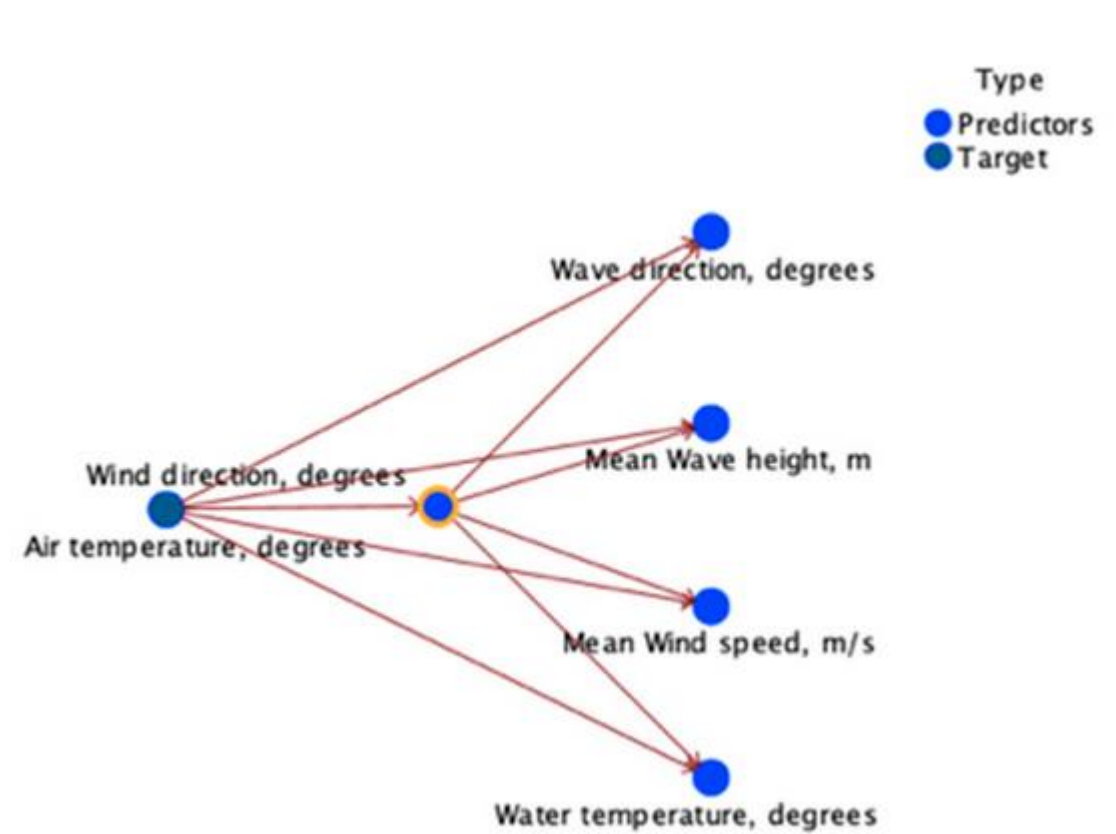
METHODS

Bayesian Network conceptual model

Dominant seaside features   Mean wave height
Atmospheric pressure   Wave direction
Air temperature   Wind direction
Water temperature   Wind speed

Blue flag sites   Biosphere reserves
UNESCO world heritage

Economic dimension

Environmental/ecological dimension

SUSTAINABILITY

Social dimension

Planning, management, development documents
Protected areas

Number of monthly mentions
Sentiment ratio
Klaipėda survey

RESULTS

South Baltic data

Hydrometeorological data;

RESULTS
SUMMARY

➢ Air temperature and wind direction were shown to be of greater importance in relation to other physical geographical factors;

➢ Beach for the recreation – most important predictor: distance to the beach;

➢ In the off-season, the highest conditional probability was shown in the Melnragė I and Girulių beaches, as well as other, nonofficial beaches;

➢ The existence of a Blue Flag award was a significant predictor concerning development plans;

➢ The presence of sandy beaches and dunes were shown to be the highest influential predictors.

CONCLUSIONS

1. The Bayesian approach provides valuable tools that have a wide range of applications and levels of difficulty.

2. Physical geographical affected by factors of the other two pillars of sustainability—the economy and society—than by the system itself.

3. Physical geographical factors such as *location*, beach type (sandy beaches and dunes), acceptable bathing water temperature, and air temperature play a significant role .

4. Significance of the sandy beaches and dunes is widely reflected in the planning documents at the regional level.

Klaipeda University | **EU CONEXUS**

ACKNOWLEDGMENT:

BALTIC RESEARCH PROGRAMME (EEA FINANCIAL MECHANISMS 2014-2021) PROJECT "SOLUTIONS TO CURRENT AND FUTURE PROBLEMS ON NATURAL AND CONSTRUCTED SHORELINES, EASTERN BALTIC SEA" (EMP480).