



# Final report

**COMTESS - Sustainable coastal land management:**

**Trade-offs in ecosystem services**

**of the BMBF-Research Programme "Sustainable Land Management"**

**BMBF - Support Code: 01LL0911 F**

**Duration of the project: 2011 – 2014**

**June 2015**

SPONSORED BY THE



Federal Ministry  
of Education  
and Research



## Final report

---

Applicant:  
**University of Hohenheim**

Support code:  
**01LL0911 F**

---

Project title:  
**COMTESS - Sustainable coastal land management: Trade-offs in ecosystem services**

---

Head and coordination of the project:  
**Prof. Dr. Michael Kleyer**  
**Martin Maier**  
**Landscape Ecology Group**  
**University of Oldenburg**  
**26111 Oldenburg**

---

Duration of the project:  
**1<sup>st</sup> April 2011 to 31<sup>st</sup> December 2014**

---

Reporting period:  
**1<sup>st</sup> April 2011 to 31<sup>st</sup> December 2014**

---

## Table of content

<b><i>List of Tables</i></b> .....	<b>4</b>
<b><i>Abbreviations</i></b> .....	<b>5</b>
<b><i>Brief description</i></b> .....	<b>6</b>
Assignment of tasks .....	6
Requirements for the accomplishment of this project .....	7
Planning and progress of the project .....	7
Scientific and technical status.....	8
Cooperation with third parties .....	8
<b><i>Detailed description</i></b> .....	<b>9</b>
Application of budget and achieved results in detail .....	9
Major positions of numerical verification.....	9
Necessity and adequacy of the accomplished tasks .....	10
Expected use – in particular the usability of the results in terms of the updated exploitation plan .	10
Third party results in fields of research relevant for the work within this project during the accomplishment .....	10
Published or planned publications of the results .....	11
<b><i>Appendix: control of success – report</i></b> .....	<b>12</b>
Contribution of the results to the subsidies politicizes goals .....	12
Scientific-technical results of the project .....	12
Update of exploitation plan.....	13
Works with no solution .....	13
Possibilities of a presentation for the user .....	13
Adherence of the budget estimation and the work plan .....	13
<b><i>Appendix 1 : Detailed scientific-technical results of the work packages</i></b> .....	<b>14</b>
<b><i>Appendix 2: Data tables</i></b> .....	<b>28</b>
<b><i>List of references</i></b> .....	<b>31</b>

## List of Tables

Table 1: WP6.1 Tasks .....	6
Table 2: Plan of procedures to prepare the main survey.....	7
Table 3: Summary of funded position WP 6.1 .....	7
<i>Table 4: Milestones of the subproject .....</i>	<i>7</i>
<i>Table 5: Status of deliverables .....</i>	<i>7</i>
Table 6: Total funding of WP 6.1 according to notice of amendment of 06.06.2014.....	9
Table 7: Allocation of the grants.....	9
Table 8: Top 5 of the most important ESS as ranked by the respondents.....	13
Table 9: Surveyed regions.....	16
Table 10: Period, region and number of pretests .....	17
Table 11: Explanation of socio-demographic variables used for the model.....	20
Table 12: Socio-demographic determinants of WTP .....	21
Table 13: Explanatory variables of the extended model.....	22
Table 14: Extended general model of the determinants of WTP.....	23
Table 15: Explanatory variables for the model comparison of East / West .....	24
Table 16: Independent group t-test on for F2F and INTERNET.....	25
Table 17: Extended model, individual analysis for LowSax and MeckPom.....	26
Table 18: Ranking of the most valued ESS by share of overall nominations (F2F+INTERNET).....	27

## Abbreviations

CEG	Citizen Expert Group
CV	Compensating variation
CVM	Contingent Valuation Method
ESS	Ecosystem service
EV	Equivalent variation
LowSax	Lower Saxony
MeckPom	Mecklenburg-Western Pomerania
NOAA	National Oceanic and Atmospheric Administration
Q1	1. quarter
Q2	2. quarter
Q3	3. quarter
Q4	4. quarter
WP	Work package
WTP	Willingness to Pay

## Brief description

### Assignment of tasks

The goal of work package (WP) 6.1 is to provide an economic evaluation of an adapted land management option in the project regions of Lower Saxony (LowSax) and Mecklenburg-Western Pomerania (MeckPom) under the premise of the expected effects of climate change on these regions. Because of its public good characteristic, a changed land management cannot be evaluated based on market prices for which households can usually formulate their demand. To estimate the social value of a certain measure, based on the individual household's willingness to pay (WTP), it is hence necessary to estimate the value of such a measure via direct survey methods. The most popular method for the economic assessment of such environmental projects is the so called Contingent Valuation Method (CVM). With the help of the CVM it is possible to estimate the demand for an environmental good by creating hypothetical markets for the good in question. For this purpose, representative samples are drawn from the population affected by the environmental quality enhancing measure and confronted with a precise description of this. Subsequently, households are asked to state their WTP for the implementation of the project. Based on neoclassic welfare economics, the stated individual WTPs can be interpreted as a measure for the change in utility of a household (in terms of the Hicksian compensating variation). The mean willingness to pay of the sample can be aggregated over the total population affected, in order to determine the induced change in social welfare of the given project. The estimation of the change in social welfare will be conducted in WP 6.1 via direct surveys of representative samples of the population affected by the COMTESS policy. The survey methods used comprise direct, face-to-face surveys, self-administered mail-based surveys and an online survey. Furthermore, it will be investigated whether socio-demographic factors and personal attitudes of respondents have an effect on the WTP for the project. Additionally, a comparative study on the determining factors of individual WTP of households in LowSax and MeckPom is of interest in order to estimate the effects of differences in cultural backgrounds on the willingness to contribute to future environmental problems. The most important tasks of WP 6.1 are listed in Table 1:

Table 1: WP6.1 Tasks

WP 6.1
Task 1: Economic assessment of the social value of an adapted land use in LowSax and MeckPom with regard to climate change.
Task 2: Examination of the socio-demographic factors as well as the influence of personal attitudes of the respondents on to the willingness to pay.
Task 3: Comparative study of the different determinants of willingness to pay between LowSax and MeckPom.
Task 4: Estimation of the influence of uncertainty on expected future utility.
Task 5: Application of participatory measures (such as Citizen Expert Groups).

Participatory approaches have been implemented in both project regions to contribute to the success of the survey. These approaches include in-depth interviews with residents and authorities of the respective regions as well as the implementation of so called "Citizen Expert Groups" (CEGs). Here, the CEG participants are viewed as representatives of the general population in terms of their intellectual capabilities for questions regarding the coherence, plausibility and neutrality of the survey. CEGs were hence consulted during the different phases of the development of the questionnaire from the conceptual design to its implementation as a main survey. The preparatory work prior to the implementation of the survey in LowSax and MeckPom can be split into four phases as shown in Table 2.

Table 2: Plan of procedures to prepare the main survey

Preparatory work for the main survey	Time span
Task 6.1.1 In-depth and expert interviews	Q2 2011 – Q1 2012
Task 6.1.2 Development of scenarios for the CVM interviews	Q3 2011 – Q4 2013
Task 6.1.3 Development of the questionnaire together with the CEGs. Test of scenarios and choice cards with CEGs.	Q1 2012 – Q4 2013
Task 6.1.4 Questionnaire pre-tests, followed by main surveys	Q1 2012 – Q1 2014

## Requirements for the accomplishment of this project

Table 3 gives a summary of the hours funded for the project-based position.

Table 3: Summary of funded position WP 6.1

Granting period	PhD student (50 %) [months]
2011	7
2012	12
2013	12
2014	3
<b>Gesamt</b>	<b>34</b>

## Planning and progress of the project

Table 4 shows the milestones set in the progress reports. A more elaborate depiction of the individual steps necessary for step 1 is given in Table 2.

Table 5 depicts the status of the deliverables of WP 6.1.

Table 4: Milestones of the subproject

WP 6.1	Status
1. Implementation of surveys to elicit WTP	finished: Q1 2014
2. Analysis of WTP determinants	finished: Q1 2014
3. Papers WTP	in progress

Table 5: Status of deliverables

WP 6.1 COMTESS Deliverables	Status
D 6.1.1	Assessment of the social benefits accruing from the analysis of the determinants of the willingness to pay for coastal ESS. finished
D 6.1.2	Improved participatory techniques to optimize Contingent Valuation Methods and Choice Experiment survey design. finished

## Scientific and technical status

The Contingent Valuation Method (CVM) has been established as one of the major instruments to evaluate the social value of public projects in the economic literature (Carson & Hanemann, 2005). A CVM study is based on surveys of representative samples of the population affected by the project under consideration. In the respective interviews, participants are asked to state their willingness to pay (WTP) for the realization of that project. Therefore, participants are asked for the maximum amount of money they would be willing to give up in order to support the respective project. The social value of the project is then determined by aggregating the maximum WTPs of all household affected. The stated WTP of a person for the realization of a certain project is interpreted as the monetary equivalent of the utility the individual expects to gain from the project (Bateman et al., 2006). One of the advantages of the CVM over environmental valuation methods that draw on revealed preferences is that it is able to reflect both use and nonuse values (Mitchell & Carson, 1989).

The development and implementation of the survey was based on the existing economics literature on the Contingent Valuation Method. The scientific foundations of the CVM as well as the critique on the theoretical and empirical aspects of the CVM have been discussed by e.g. (Desvousges et al., 1993; Diamond & Hausman, 1994; Cummings et al., 1995; Carson et al., 2001; Freeman, 2003; Carson & Hanemann, 2005; Bateman et al., 2006; Kumar & Kumar, 2008) and especially in (Mitchell & Carson, 1989; Arrow et al., 1993; Hanemann, 1994; Carson et al., 1996). The organisation and moderation of the CEG meetings was based on the subject-specific literature (Morgan, 1996; Krueger, 1998; Chilton & Hutchinson, 1999; Ahlheim et al., 2010). In order to determine the relevant statistical data regarding the population of both regions, the online information of the federal statistic bureaus of both LowSax and MeckPom as well as the census data of the Federal Statistical Office of Germany were used.

## Cooperation with third parties

The region-specific questionnaire was developed in correspondence with WP 0, WP 7.1 and WP 7.2. In order to develop the scenario of the questionnaire WP 0, 1, 3, 4 and 7 gave subject-specific advice. Further, WP6.1 participated at the World Cafés of WP 7.1 that were conducted in Q1 & Q2 2012. The implementation of the respective pretests and the main surveys in both regions were administratively supported by WP0 and WP1.1. To generate the internet sample, an external partner (Norstat Deutschland GmbH) was commissioned. In order to select the recipients of the mail survey, a data DVD containing a directory of landline phone numbers for the project regions in LowSax was used (Deutsche Telekom Medien GmbH and TGV Telefonbuch- und Verzeichnisverlag GmbH & Co. KG). The results of the evaluation of ecosystem services (ESS) of both project regions were handed to WP 0 and WP 8.



## Detailed description

### Application of budget and achieved results in detail

#### Major positions of numerical verification

Table 6: Total funding of WP 6.1 according to notice of amendment of 06.06.2014

Granting year	Grants excluding project allowance [€]	Grants including project allowance [€]
2011	16.382,70	18.020,96
2012	39.655,61	43.621,18
2013	38.131,29	41.944,42
2014	45.992,4	50.591,64

Table 7: Allocation of the grants

Granting year	Accounts [€]	Bill [€]
2011	Labour costs (0812)	14.463,26
	General administrative expenses (0843)	16,10
	Student research assistants (0822)	0
	Travel costs (0846)	1.962,47
2012	Labour costs (0812)	22.729,00
	General administrative expenses (0843)	1.270,11
	Student research assistants (0822)	0
	Travel costs (0846)	4.532,69
2013	Labour costs (0812)	33.552,44
	General administrative expenses (0843)	2.164,14
	Student research assistants (0822)	4342,49
	Travel costs (0846)	7.298,38
2014	Labour costs (0812)	7.170,34
	General administrative expenses (0843)	7.096,98
	Student research assistants (0822)	25.344,78
	Travel costs (0846)	8.083,79
2011-2014	Labour costs (0812)	77.915,04
	General administrative expenses (0843)	10.547,33
	Student research assistants (0822)	29.687,27
	Travel costs (0846)	21.877,33
Gesamt		140.026,97 €€

## **Necessity and adequacy of the accomplished tasks**

The evaluation of the utility gained (or lost) from a changed land management by the public is an important argument for a decision on the implementation of a publicly funded measure. Here, the utility gain (or loss) that is perceptible for the population plays a crucial role since it can significantly differ from an ecological-desirable management option. To evaluate the gain in social welfare of a changed land management it is hence advisable to directly poll the affected population to be able to monetise the sum of direct and indirect use values. In order to conduct such a survey extensive research of the given geological, biological and political frameworks is a prerequisite. As part of this, extensive interviews with experts on the respective subjects of the other WPs were conducted (e.g. landscape ecology, hydrology, ornithology and phytology) and in-depth interviews with the general population in LowSax and MeckPom were realized in order to design tailored questionnaires. Based on these preliminary talks, the questionnaire had to be tested and adapted in several rounds of pretesting.

## **Expected use – in particular the usability of the results in terms of the updated exploitation plan**

The gains in utility for the proposed land usage in LowSax and MeckPom, as estimated by WP 6.1, can be contrasted with the respective cost of the projects. Hence, the results can be of crucial importance for future cost-benefit calculations of the public body. WP 6.1's results serve as a contribution to the decision-making process of future land management options in both regions. It can also be used as a benchmark for analyses in other coastal regions with similar conditions (e.g. in the federal state of Schleswig-Holstein or in other coastal regions in Europe). The insights on the effects of personal attitudes and individual characteristics on the willingness to contribute to a public good could be of further importance for future investment decisions with respect to the topics of climate change and coastal protection. The results on the perceptibility and importance of different ESS for the population are helpful for planning future measures to inform about the effect of climate change on the respective coastal regions. This might be especially useful as a basis for future information- and teaching campaigns by the public sector.

## **Third party results in fields of research relevant for the work within this project during the accomplishment**

For the research focus of WP 6.1 there were no relevant insights published by other authors during the funding period. Two studies are worth mentioning, however, as they have been carried out in the two project regions of LowSax and MeckPom.

A study by (Restemeyer et al., 2012) has conducted a non-representative online-survey for the inhabitants of the federal state of LowSax (n = 1,368). The study's focus lays on determining the awareness of the population for flood-risks and to elaborate on possible methods to engage greater household participation. A similarity to the research in WP 6.1 can be drawn to the estimated flood risks by the participants of both studies. In both cases, the respondents subjectively estimated a low risk of floods in their hometowns.

As part of the BalticStern report, the study by (Ahtiainen et al., 2012) estimated the value of a reduction of eutrophication of the Baltic Sea. For this study, a non-representative sample of households was collected by telephone interviews (n = 1,000) and a willingness to pay for an increased water quality was estimated. From the same study (Ahtiainen et al., 2013) also analysed the preferences of the sample with respect to the preferred utilisation and the state of the Baltic Sea. Both studies do not overlap with the intended evaluation of a climate change induced land management adjustment of WP 6.1.

## **Published or planned publications of the results**

So far, no studies on the data gathered by WP6.1 have been published. Possible future publications might include the effects of certain attitudinal- and personality-specific characteristics of individuals on the WTP for public projects. Furthermore, a comparative study between the used survey methods and between the two project regions is contemplated. A joint publication with WP 7 and WPO on the differences and commonalities of the assessments of the ESS by private households and stakeholders has been discussed.