REPORT

D4.2 Final Scenarios

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Authors: Susan Baggett; Geoffrey D Gooch
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Summary

The main concept underpinning the LAGOONS project was that knowledge produced via different scientific disciplines needs to be combined with local knowledge and stakeholders' views in order to produce integrated, participatory scenarios (supplemented by science modelling inputs) of possible future trends and conditions in coastal lagoons. For the duration of the LAGOONS project this aim was sought through active engagement of stakeholders (and policymakers) via a three stage participatory process (namely: focus groups; citizens juries; scenario workshops) in each of the four case study areas (CSAs). Ultimately, the project facilitated the consideration of combined scientific, local community and overall policy interests in the evaluation and adjustment of the possible future scenarios and management models built, developed and deliberated upon during the course of the project.

This report specifically addresses

- The content of the qualitative scenario storylines based and formed by WP4 through analysis of the qualitative outputs from the FGs and CJs; population of the scenario storylines with numerical data by WP4, subsequently used as the basis for scenario modelling by WP5 and WP6. These scenarios were used for the final stakeholder workshops.

- The final deliberations and concluding recommendations arising from the final stakeholder workshops on the possible future scenarios modelled.

Note: The associated WP4 LAGOONS report (Deliverable 4.1 Report on raising public participation and awareness including design of uptake and capacity building activities) provides in-depth detail on the capacity building activities, participatory processes and the resultant outputs associated with the formation of the final scenarios used at the final stakeholder workshop reported here.

1. Introduction

Developing and considering alternative scenarios has become a popular tool in a number of research and management fields, not least for water resource management (Wright et al, 2012; Alcamo and Gallopin, 2009; Allouche et al, 2008). The objective of the formation and evaluation of the scenarios used and presented by the LAGOONS project at the final stakeholder workshops was to further the provision of knowledge and information required for future water management and policy making. This was achieved by combining the output of stakeholder and public deliberative participation along with scientific knowledge, statistics and data based on the qualitative storylines, providing scenarios that were formed through integrated and participatory means.

The content of this report initially provides information on the qualitative storylines, formed through the analysis and use of CSA Focus Group (Baggett et al, 2013) and Citizens' Jury outputs during the LAGOONS project and the population of those qualitative scenario storylines with corresponding numerical data based on Eurostat and other statistical compilations of existing socio-economic, land use, demographic and other data (LAGOONS, 2014 D4.1). The report then provides details of the deliberations of and recommendations put forward by the stakeholders who participated at the CSAs final stakeholders' workshops regarding the scenarios produced and presented.

1.2 Building and developing scenarios and qualitative storylines

The qualitative storylines were constructed by WP4 based on their study and analysis of the outputs of the focus groups and citizen juries held within the CSAs, following the methodology outlined by Gooch and Stålnacke (2006). During the focus groups and citizens' juries the participants were asked to: (i) identify the main driving forces of change in their lagoons; (ii) put forward suggestions of how they would like to see the lagoon in 15-20 years' time and how that could be achieved. These outputs were then analysed and used to form (loosely aggregated) DPSIR tables by WP4 in order to help sift out the qualitative material and provide the foundation for the qualitative storylines. The storylines were written to reflect four different possible futures. The main aspects of the scenarios were high or low economic development and high or low environmental quality. These were used to produce four possible scenario storylines which reflected the following future scenarios:

- Business as Usual (BaU) – describes how the future (in this case 2030) could develop based on known changes and past trends, without any major deviation from present arrangements regarding economic growth or environmental quality.

- Managed Horizons – an alternative future where both economic and environmental factors are positively used to provide tangible human benefits but are co-managed in a way that not only does no harm but may also benefit the environment.

- Set Aside – a future which may not provide direct tangible increases in benefits to the residents of the CSA but may provide indirect economic and environmental benefits to the area predominately through the value of and payment for ecosystem services and through ecological conservation.

- Crisis – where both economic decline and environmental degradation of the study area impact on the well-being and livelihoods of the CSA residents and severely affect any economic, social and environmental recovery of the lagoon.

1.3 Populating storylines with quantitative data

The drivers identified in the qualitative storylines were sub-divided into constituents that could be quantified through the use of Eurostats and other compilations of statistics. The first task was to identify the base-line figures and to extrapolate future trends for the 'business as usual' scenarios. These were calculated, where possible, on the basis of developments during the last 10 to 11 years, but this was dependant on the time series available for the data. Where possible NUTS3 data were used, otherwise NUTS2 data were utilised. In some cases, national level data were used when considered to be appropriate for use at the scale of the CSA if not available at a finer scale. For example, national GDP figures were used in all instances. The BAU scenarios for the year 2013 were then calculated using a continuation of these trends during the coming 17 years to 2030. The other three alternative scenarios were also populated with corresponding numerical data (using analyses of present conditions in the case areas) to reflect, in quantitive terms, the futures as depicted in the corresponding qualitative scenario storylines. For example, the 'Crisis' scenario for Mar Menor depicts the resident population as decreasing by 20% and a 10% decrease in the amount of land available for agricultural. The quantitative data relates to a number of features in each of the storylines given below. The percentage changes provided in each of the scenario columns on the spreadsheet per CSA is the change seen in the corresponding baseline figure provided per attribute listed in the spreadsheet. Some of these variables were used as the basis for quantitative modelling by Bioforsk, WP5 and WP6, some included in the final refinement of the scenarios, before presentation in poster format to the stakeholders at the final workshops. The variables used and calculated form part of this report and are provided in Appendices I and II.

2. Scenarios for LAGOONS to 2030

The following scenario storylines were written and developed by WP4 through qualitative analysis of the content of focus groups and citizens' juries outputs, namely: Mar Menor, Spain; Ria de Aveiro, Portugal; Tyligulskyi, Ukraine; Vistula, (Poland only). Four scenarios per CSA were written: Business as Usual (BaU), Managed Horizons, Set Aside and Crisis. As stated in the previous section, actual socio-economic and land use statistical data available on the Case Study Areas (CSAs) was extracted and manipulated by WP4 to offer tangible quantified changes to complement the qualitative depictions provided in each of the sixteen scenario storylines (four per CSA) presented here.

2.1 Mar Menor

2.1.1 BaU

Spain has now been a member of the EU for 44 years. The total resident population of the area has increased by 28% and employment in the area keeps declining, with more than 30% of 15-64 year olds unemployed and very little in the way of employment for the under 25s. Urbanisation and intense development in the form of hotels, apartments and associated

holiday businesses continues and the number of holiday bed places has grown by 50%, mainly to cater for the anticipated high influx of tourists, visiting primarily during the summer months. Tourist numbers however, even during peak season (June – August), have only risen by 2% as it is no longer viewed as a prime destination for holidays. Some highly urbanised parts of Mar Menor are still completely abandoned during the winter months, particularly La Manga.

The increased level of wastewater and the lack of wastewater treatment plants to deal with the summer surge of tourists affect water quality. However, it is not the only main factor affecting water quality as indirect discharges due to agricultural runoff and direct discharges into the lagoon via the Albujón wadi plus the phreatic level/heavy rains also carry nutrients and chemicals into the lagoon, promoting eutrophication and the appearance of algal blooms. This is despite the decline in agriculture area utilised in the area.

While various lagoon species (for example local 'chapinas' little clams) are in decline, jellyfish, both in numbers and type of species have increased (estimate at 2002 was 47 million individuals every summer according to Pérez-Ruzafa et al. 2002) along with some other non-native species. The commercial species in the lagoon are also impacted by illegal fishing and the lack of required monitoring and penalties. These factors along with high recreational boat numbers, particularly motor boats, plus sheer overcrowding of the lagoon at peak season are impacting on existing tourism and leading to further ecological and environmental degradation.

Poor all round management of the area and the lack of coordination between the administrative bodies responsible for the area has been evident for decades. The lack of enforcement of control and regulations within the lagoon further compounds the impact of these pressures on the lagoon and consequently the natural status of the lagoon has deteriorated further. There has only been a 9% increase in total environmental protection expenditure.

2.1.2 Managed Horizons

The resident permanent population has risen by 10% since 2011 and employment has risen by 15% for 15-64 year olds and nearly 25% for the under 25s. Urbanisation has slowed down drastically with local sustainable planning incentives to refurbish older properties to a high environmental standard (sustainable construction standards such as e.g. BREEAM, CEEQUAL, SKA, and LEED) for mixed use (residential, tourism, shops and services) revitalising existing areas or properties rather than build anew. The total amount of agricultural land available remains unchanged.

While the holiday industry is still a major economic benefit for the area it is much more diverse (e.g. health, wildlife, sports training) attracting a broad set of visitors and whose numbers are dispersed more evenly than before over the entire year, accounting on average for 20% in addition to the permanent resident population. There are a number of low impact eco-paths and cycle routes that link the whole basin. Businesses - both those associated with the tourist industry and other forms of business in and surrounding the lagoon - adhere to and actively promote an agreed environmental and sustainability code/programme for protecting the lagoon. The code/programme is overseen by a dedicated local commission which is answerable to and supervised by a higher body (e.g. the European Union).

Water quality has improved considerably over recent years mainly due to the: increased capability of the wastewater plants; regular monitoring of agricultural runoff with active advice

on and enforcement of land management practices if need be; immediate monitoring and remediation of any extra nutrient loads or pollution into the lagoon due to heavy rainfall or raised phreatic levels. The integrated management and planning of natural resources usage in the area includes the use of all forms of water resources, with hefty penalties for illegal water extraction.

Due to increased overall environmental vigilance in and around the lagoon algal blooms are now much less frequent and the number and type of jellyfish species have decreased dramatically while the numbers of indigenous lagoon species have steadily increased. Artisanal fisheries are prominent, well managed and sustainable, with poaching at an all-time low due to strict regulations. The number and type of boats (rowing, sailing, motor) allowed in the lagoon are well regulated and favour non powered vessels, with speed limits in place. Due vigilance and corresponding penalties are applied regarding any illegal fishing and unethical competition. Some land and water based protected areas have only seasonal access. There is a 30% increase in total environmental expenditure.

2.1.3 Set Aside

The overall population has decreased by 10% and the employment rate has declined by twenty percent. Urbanisation has slowed down drastically with some sustainable planning incentives to refurbish older properties for mixed use (residential, tourism, shops and services) revitalising existing areas or properties rather than build anew. The number of tourist bed places has declined by ten percent. The total amount of agricultural land available has dropped by 15% but is better managed.

Mar Menor lagoon and its surroundings are well managed by the local municipalities and its broad set of local and regional stakeholders (which include the local and regional authorities, business people, agriculturalists, fishermen, ecologists and local residents etc.) which form the local commission. The commission's undertakings are underpinned by an up-to-date environmental and sustainability plan for the area. They meet regularly to review the current status and also see what needs to be updated or further considered and included in the agreed strategic plan focusing on the sustainability of the lagoon. Overall water quality, ecological and economic status of the lagoon and the surrounding area has increasingly improved over recent years mainly due to the joint concerted efforts and actions of the stakeholders involved and the informed public within the locality. The status of these considerations is regularly monitored with the results published and made freely available. Illegal fishing carries hefty penalties and the lagoon is regularly monitored for this.

While overall tourist numbers have declined by 5% tourism in the area has diversified and is spread more evenly over the year. An upsurge in eco and cultural/heritage tourism is attracting a steady number of visitors throughout the year, providing a much higher than usual regular income and more economic security to the region. There are a number of low impact eco-paths and cycle routes that link the whole basin. A number of land and water based designated protected areas have either restricted or no access which benefits the area by providing essential recuperation of natural resources that in turn generate indirect income through the ecosystem services provided to the region. There is a 60% increase in total environmental expenditure.

2.1.4 Crisis

The overall population in the area has declined by 20% and unemployment is running at 75%, with the majority out of work being less than 25 years of age. Urbanisation and intense

development in the form of hotels, apartments and associated holiday businesses has escalated by a further 10% in anticipation of increasing tourist numbers, without any form of control or protection for the lagoon or the surrounding environment. Older buildings or failed developments are left to crumble. The amount of land available for agricultural has dropped by 10% and the area utilized for agriculture has dropped by thirty percent.

The highest influx of tourists is still primarily during the peak summer months, accounting for a twenty fold increase in relation to the local population during peak times. The number of tourist bed places available has increased by 10%; however tourist numbers for the year in total have dropped by ten percent. The area attracts tourists who come predominantly for cheap beach based summer holidays on or near the lagoon. The amount of wastewater and the lack of wastewater treatment plants to deal with the influx of tourists has had a drastic effect on the water quality and led to critical environmental degradation of the lagoon. However, it is not the only factor affecting the water quality and ecological status of the lagoon as unregulated and uncontrolled agricultural runoff and direct discharges into the lagoon along with the phreatic level/heavy rains which also carry nutrients and chemicals into the lagoon, constantly promote eutrophication and the frequent appearance of algal blooms. A number of indigenous and important lagoon species (for example local 'chapinas' little clams) are threatened or extinct, while jellyfish and other invasive species proliferate both in numbers and type of species.

The ecological status is further worsened by the continually increasing rate of uncontrolled and unpunished illegal fishing practices. High boat numbers and the ever increasing overcrowding of the lagoon at peak season is severely impacting existing tourism and leading to continuous environmental degradation and health issues. Poor, uncoordinated or absent all round management and the lack of enforcement of control and regulations within the lagoon further compounds the impact of these pressures on the lagoon. There is a 40% decrease in total environmental expenditure.

2.2 Ria de Aveiro

2.2.1 BaU

Portugal has been a member of the European Union for 44 years. The resident population of Aveiro has increased by six percent. Employment however has continued to slowly decline, with more than one third of 15-64 year olds out of work with the under 25s accounting for more than 60% of the unemployed in the area. Traditional employment and associated activities within the local population also continues to fall. People in the area are more and more reliant on obtaining other forms of employment, but the likelihood of securing another job in a different economic sector due to economic decline is also uncertain. These economic changes are also due in part to the changing hydrological dynamics and increased water velocity within the lagoon which impacts the sea grasses, reeds and the natural and nurturing environment of the lagoon's sea bed and surrounding land and can no longer provide a steady reliable income for local populations. The total area available for agriculture has decreased by 10% since 2009.

Competing demands on the lagoons' resources between the interests of the harbour and the local fishermen is prominent. There is also a high level of concern shown by the professional fishermen due to the impact of recreational fishermen, the use of illegal fishing gears, increasing pressure on fish and shellfish stocks and the long term impact of intensive bait digging. Monitoring by the port authorities is inadequate. Some level of historical industrial

pollution (e.g. Largo do Laranjo) is still present and there is a temporary ban again on shellfish harvesting due to the presence of biotoxins.

Environmental and ecological conditions in the lagoon also continue to deteriorate due to the lack of structures to control the currents and water velocity. Failure to finish the Baixo Vouga dike further promotes the erosion of the lagoon's banks and saltwater intrusion of the surrounding land. A number of invasive species (flora and fauna) have established populations within the lagoon, while the natural system of the lagoon and its associated flora and fauna are in decline. Level of investment is low and the overall management of the lagoon and its surrounding areas are uncoordinated between the municipalities with very little stakeholder and end user engagement and input. In general regulations are poorly enforced. Public transport in the form of ferries and speedboats in the region is sparse, with some areas on the lagoon being difficult to reach other than by personal transportation or taxi. The potential for sustainable tourism and eco-tourism across the whole lagoon area is high and the numbers of visitors overall has increased, but there is also low investment and planning in this sector. There has been an increase of 65% in total environmental protection expenditure since 2011.

2.2.2 Managed Horizons

The resident population of Aveiro has increased by twelve percent. Employment has increased by 15% for 15-64 year olds and the number of under 25s in employment in the area has increased by twenty percent. Ria de Aveiro is both a thriving port and highly sustainable fishery and is the economic hub for a number of local and some national and international companies, employing a good proportion of residents full time. Stable economic success, through the promotion of the area's highly regarded fisheries and agriculture, including certified agricultural and traditional produce and crafts, is evident. The total available area for agriculture remains unchanged, but is better managed.

Traditional forms of employment and associated activities within the lagoon area as a whole are again a vital part of the economy and wellbeing of the lagoon, with certified high quality local produce and crafts from the region being promoted and sold in the domestic, tourist and international markets. The area is also widely respected and recognised as a desirable tourist destination having just been awarded the EU European Destination of Excellence (EDEN) award for sustainable ecotourism. This success is mainly due to the concerted and cumulative efforts of all the stakeholders of the local environmental strategy plan, which pays particular attention to good ecological and atmospheric quality to maintain:

- A balance between the natural, ecological and hydrological conditions of the whole lagoon area and regulation of associated economic and traditional activities.
- The navigability of the channels.
- Control of the waters by appropriate port infrastructures.
- Further improvements to WWTP and industrial infrastructures as required, retaining good water quality.
- Low levels of saltwater intrusion.
- A diversity of both aquatic and land based plants and animals within the lagoon area.

Integrated sustainable management objectives shared between stakeholders, which include, amongst others, the local fishermen (both professional and recreational) the port authorities, business sector, residents, agriculturalists, artisans, tourist board, hunters, ecologists and the university, are based on ecological sustainability (as it is recognised and respected as a

prerequisite for social and economic sustainability) and reviewed and revised regularly, depending on the feedback from the scheduled monitoring and localised spot checks of the lagoon. The underlying 'living document' management plan is reviewed, updated and acted upon by a single autonomous entity – a committee of stakeholders, with representatives from all the municipalities of Aveiro included, alongside the local/regional decision makers - to take into account the multifaceted nature of the lagoon and any adaptive requirements. The committee also support local environmental or traditional activities educational programmes, often in association with the tourist board.

There are a number of low impact ways to get around the lagoon, including frequent scheduled boat ferries that move around the entire lagoon throughout the year, cycle routes and walking paths, multiple occupancy low cost taxis etc. The use of fishing gears and fishing practices are well regulated, licensed and monitored. Specific supervised areas are designated for the fishing and harvesting of clams. A number of sea and land areas have designated closed seasons. There has been an increase of 200% in total environmental protection expenditure since 2011.

2.2.3 Set Aside for Aveiro

The resident population of the area has decreased by fifteen percent. Overall employment in the region has decreased by twenty percent. Ria de Aveiro is however a well supervised port and sustainable fishery, providing stable employment for a number of local residents. The economic stability of the marine area is due to specific supervised areas which are designated for the fishing and harvesting of clams. A number of both sea and land areas have also designated closed seasons and additional closures in secondary areas added if monitoring of the primary designated areas shows a need. The total amount of land designated for agriculture has dropped by 50%, but is better managed. In addition there are a number of conservation areas that have permanently restricted access which provide ecosystem services and an indirect income as set aside for the lagoon (including more species for hunting and fishing etc.) and the surrounding areas.

While the number of visitors to the region has only increased by 9% since 2011 and the number of tourist beds available has remained the same the economic gain from tourism is much higher and more evenly spread throughout the year due to its reputation as a desirable, sustainable ecotourism destination. This is mainly due to the concerted and cumulative efforts of the stakeholders of the region's midterm environmental strategy and the underlying 'living document' management plan. The highly inclusive management plan and monitoring schedule is regularly reviewed and adapted by the stakeholders based on local knowledge updates and scientific evidence, as required, to retain the lagoon's ecological and environmental sustainability, which is fully recognised as fundamental to both aspects of the local economy and associated social activities.

Efficient and effective low carbon ways to move around the lagoon by boat, car and bike etc. are monitored and encouraged to make sure the best solutions are retained. Levels of employment and recreational endeavours in a diverse set of traditional activities remain stable due to the targeted recovery and conservation of the lagoon's ecological and environmental systems, retention of the Baixo Vouga dike and overall efforts made regarding its hydrologic dynamics. There has been a 400% increase in environmental protection expenditure since 2011.

2.2.4 Crisis

The resident population of Aveiro has declined by thirty percent. Employment in the area has also declined further, with 50% of 15-64 year olds out of work and with 70% of unemployed being less than 25 years of age, who are leaving the area to find employment. Concentrated and ever increasing competition between harbour interests and fishermen, further aggravated by critically low levels of investment and management has dissolved any form of cooperation between the organisations affected. The presence of pollutants in the lagoon, due to badly managed and regulated economic and recreational activity, is at its highest recorded level and the overall condition of the lagoon is ecologically and environmentally unsound.

Local infrastructure and the transportation network is very rundown and local residents feel completely isolated and abandoned. Fisheries in the region have declined dramatically to unsustainable levels (fishing effort/stock numbers) and are on the verge of collapse, further worsened by fierce competition for the remaining fish stock not only between the professional fishermen but also due to the actions of recreational fishermen, neither of which are actively monitored or policed. Illegal trawling and bait digging is rife and unmonitored shellfish stocks have near enough disappeared, despite a long term ban on their harvesting due to prolonged levels of biotoxins in the area. A high number of indigenous flora and fauna, which used to be an integral and important part of the local environment and its economy, have been lost and in a number of instances replaced by highly invasive alien species, which do not help the local environment and have little commercial value.

The high level of salinization of the surrounding land due to salt water intrusion and the erosion of the lagoon's margins has severely affected the productivity of the land and the land area available for agriculture has diminished. Commercial farms have either been abandoned or are struggling to maintain their upkeep and the total area of land available for agriculture has dropped by fifteen percent. Agricultural productivity has to rely more and more on expensive feeds or additional fertilizers, with the agricultural runoff further affecting the already diminished quality of the water in the lagoon. A high number of families in the area are without a primary source of income and are now struggling to make ends meet as their secondary income source, or means of subsistence, from the land surrounding the lagoon or directly from the lagoon are so diminished.

There is a 40% decrease in the number of nights spent by tourists in the region. Employment centred on traditional activities has been completely abandoned, with only some associated relics on display in a small unmanned museum on the history of local life for the infrequent tourists passing through to view. There has been a decrease of 40% in total environmental protection expenditure since 2011.

2.3 Tyligulskyi

2.3.1 BaU

Ukraine recently joined the EU. There has been an overall population decrease in the region with a 4% decrease in Odessa oblast and 12% within Mykolaivska oblast along with a slight decrease in employment in the region as a whole. The intensification of agriculture through the use of more industrial farming methods, including the quantity of chemical fertilizers used, intensive livestock management and the upsurge in deforestation has led to an increase in rural runoff. These agricultural changes coupled with unregulated development with no new household waste or wastewater treatment facilities, unlawful and damaging use

of the landscape park and some industrial pollution have significantly contributed to the deterioration and decline of both water quality and ecological conditions, leading to eutrophication. Recent weather changes have also been observed.

Ecosystem services are declining, which is also influenced by poaching. For example, the quantity and number of species for hunting and fishing are decreasing, with periodic fish kills not unknown as well as changes in the type of fish species seen. It is evident that natural resources are declining however there is very little activity in estimating and providing an inventory of species to estimate the rate of decline. Despite the increasing need for more environmental protection the number of staff employed by the environmental authorities has not changed since 2010 and they are overstretched. The number of tourists to the area keeps increasing. In the lower part of the lagoon which is close to the Black Sea, there is significant recreation (attracting around 300,000 people annually) but it is mainly concentrated during the summer months.

There is a lack of policy, planning and environmental management and enforcement levels mainly due to low investment and insufficient legislation for implementing the management of the region as a whole. There are also competing views on uses of the landscape park and the configuration of the channel. Coastal erosion and lack of control of illegal sand mining further contribute to the area's ecological and environmental decline and there are still a number of competing views regarding the use and zoning of the landscape park and the channel. A single control unit – in the form of a National Natural Park which joins the Odessa and Mykolaiv regions - with clearly demarcated areas for different uses, including recreation and tourism is still viewed as desirable. The management and physical infrastructure required to achieve that however is still not in place. Alternative forms of energy production are also not very evident. Expenditure on the protection of the environment is low.

2.3.2 Set Aside

There has been an overall population decrease of 10% in the whole region, with a 15-20% decrease in employment in the region. The uptake of sustainable agricultural and livestock management is prominent although the total area available for agriculture has decreased. A number of land and water based designated protected areas have either restricted or no access which benefits the area by providing essential recuperation of natural resources that in turn generate indirect income through the ecosystem services provided to the region. Zoned hunting and fishing areas in the lagoon are also well managed, monitored and controlled, with designated no access areas retained for conservation purposes.

All building and development works within the area are well regulated under an agreed sustainability code for the area along with provision of household waste/recycling and wastewater treatment facilities for all households and businesses. High end recreational and ecotourism activities are prominent although overall tourist numbers have not increased significantly and have been developed following strict planning and control procedures which are sustainable and provide a sound economy and stable employment in a number of sectors for the area, which is becoming well established and gaining a good all round reputation. Environmental management and enforcement throughout the area is backed up by clear and transparent policies, which also contributes to the maintenance of the areas as a coastal ecological corridor. Regular meetings are held for stakeholders to meet, discuss and resolve any issues regarding, for example, the landscape park or channel/water exchange. Total expenditure on the protection of the environment has increased.

2.3.3 Managed Horizons

There has been an overall population and employment levels remain unchanged in the whole region. While the area of land for agriculture also remains unchanged there are positive changes seen in the landscape and environmental status of the area due to revised practices in relation to agriculture, livestock management and levels of forestation which are reviewed and appropriate recommendations and actions taken. These agricultural changes coupled with a well regulated and updated sustainability code ensures that: buildings and any form of development adhere to the code; household waste or wastewater treatment facilities are always adequate; ecologically sound use and status of the landscape park is retained; the likelihood of pollution events due to industry in the area is low. These actions contribute to the continued safeguarding of both water quality and ecological conditions, minimising the chances of eutrophication.

Ecosystem services are steadily improving enhanced by regular monitoring and reporting of any changes or possible impacts. For example, the quantity and number of species for hunting and fishing are increasing and there is a full examination of the causes when periodic fish kills or any other unusual event occurs to establish a cause. The recent weather changes which have been observed are closely monitored in case action is required.

Policy, planning and environmental management and enforcement levels are improving due to higher investment levels. Competing views on uses of the landscape park and the configuration of the channel exist, however current action plans are regularly reviewed jointly by stakeholders and authorities. Coastal erosion due to weather events or climatic changes is closely monitored and remedial action taken as required while illegal sand mining is strictly prohibited. The expenditure on protecting the environment has increased.

2.3.4 Crisis

There has been an overall population decrease of 30-40% and employment levels have dropped by nearly 20% in the whole region. Intensification of agriculture and livestock management has rapidly increased along with severe and continuous deforestation which has led to very high levels of rural runoff. High levels of unregulated development with no household waste or wastewater treatment facilities, unmonitored, uncontrolled and unlawful use of the landscape park and high levels of industrial pollution also contribute significantly to the severe decline and worsening of both water quality and ecological conditions, leading to eutrophication.

Ecosystem services have declined rapidly due to ecological and environmental deterioration, which are further impacted by heavy poaching of fish and game animals. For example, the quantity and number of species for hunting and fishing are very low, with frequent fish kills as well as changes in the type of fish species seen. Recent weather changes have also been observed. A complete lack of policy, planning and environmental management and enforcement levels is predominantly due to low investment. There are also competing and intractable views on uses of the landscape park and the configuration of the channel with no management of the situation to try and resolve them. Coastal erosion and illegal sand mining has also significantly contributed to the area's ecological and environmental decline. The expenditure on environmental protection has declined.

2.4 Vistula (PL side only)

2.4.1 BaU

The overall population in the region remains unchanged but overall employment levels have increased by 22% from 2010 levels. However, diversification of the job sector – particularly in Warmińsko-Mazurskie is slow. Job opportunities directly around the lagoon are lacking and there is an outflow of people – particularly the younger skilled generation. Local transportation links are slightly improved but still inadequate with few ferry and road linkages to major routes. Infrastructure for and management of transport, fishing, industry, flooding/drainage and sustainable tourism is still inadequate, further compounded by poor levels of initiatives, investment and promotion of the area. There is a lack of, or inappropriate levels of, maintenance or conservation of the lagoon (which is also designated as a Natura 2000 site) and the surrounding area which also suffers from illegal dumping.

Poor and irregular local administration which does not include local stakeholder involvement is coupled with either inter-municipality competitiveness or failure to act by the local authorities regarding any potential funding or investment bids. There are also regulatory imbalances and poor communication channels between PL/RU regarding a number of issues as with, for example, fisheries. EU regulatory limits are in place for the Polish side whilst facing competition from the Russian side for the lagoon's resources. Traditional fish stocks are declining (e.g. eel, pike-perch, salmon) which are also affected by lack of funding for stocking the lagoon with juvenile fish, poaching and the high number of cormorants (8000 bp in KR 2010) living and nesting in the lagoon. However, a few individuals are trying to do something, e.g. redevelopment of cathedral hill at Frombork; there are some attempts at resuming the practice of restocking the lagoon with juvenile eel.

There has been a 5% increase of the total available area for agricultural use. While there has been local interest in developing agro-tourism and ecotourism these sectors are in decline and while visitor numbers have increased the visitors that do come to the area tend to be mainly only day tourists or for short trips. As the demand for tourist bed places has dropped then the available bed spaces have also declined. Despite the use of fertilizer on the fields being less intensive and an increase in the number of wastewater treatment plants water quality is decreasing along with the increasing occurrence of algal blooms, particularly during the peak holiday months in summer. The Polish side of the lagoon is also severely impacted by the S22 road leading up to the Russian border, with many towns and localities having restricted or no access to their properties due to reduced number of junctions. There are varying opinions, in favour and against, the plans for a cross-cut across the Spit to gain access directly to/from the sea from the Polish side. However, it looks unlikely as the funds required are lacking and there is insufficient need for it.

2.4.2 Managed Horizons

The resident population has increased by 3-6% and employment in the region has increased by 35% percent. Job opportunities are available across a number of sectors and there is a low outflow of people – particularly the younger skilled generation. The required infrastructure for transport, fishing, industry and sustainable tourism is in place and helps to further and encourage initiatives, investment and promotion of the area. Flood management and drainage issues are jointly supervised by all the local authorities. Conservation of the lagoon as a Natura 2000 site is well monitored and maintained and the illegal dumping that used to be widespread is virtually non-existent with any sightings reported to authorities and acted upon immediately. The local administration actively includes local stakeholder

involvement which is coupled with inter-municipality cooperation between the local authorities regarding some larger or more widespread issues that could affect the lagoon including potential funding or investment bids. Regulatory imbalances and poor communication channels between PL/RU regarding a number of issues as with, for example, fisheries are resolved and on-going, helping to maintain the social, environmental and economic health of the lagoon. The number of visitors to the region has increased but the number of beds available remains the same as in 2011 as they are more fully occupied. Agro-tourism and eco/sustainable tourism are the dominant form of tourism and a high number of visitors that do visit stay for a week or more. While the total area available for agriculture has not changed the utilised area has increased by 25-30 percent.

The number of wastewater treatment plants and sustainable farming practices has increased and water quality is very good with algal blooms now a rare event. Traditional fish stocks are much improved (e.g. eel, pike-perch, and salmon) and poaching is kept in check by heavy fines and increased local awareness. Attempts at resuming the practice of restocking e.g. with juvenile eel are successful and a number of schemes are in place in direct cooperation with the Russians. The number of cormorants living and nesting in the vicinity of the lagoon are monitored and checked. A number of small local and nationally funded schemes to improve and restore local artefacts are also in place. Local access to the S22 road leading up to the Russian border is greatly improved. There are varying opinions, in favour and against, the plans for a cross-cut across the Spit to gain access directly to/from the sea from the Polish side.

2.4.3 Set Aside for Vistula

The resident population has decreased by 20% and employment in the region has increased by 5% percent. Job opportunities are stable across a number of sectors and the outflow of people – particularly the younger skilled generation has slowed down. The required infrastructure for the area has improved and any further improvements which may be required are closely monitored and assessed helping to further initiatives, investment and promotion while maintaining overall sustainability and conservation of the area. Flood management and drainage issues are on-going through supervision and monitoring, carried out jointly by all the local authorities.

Conservation of the lagoon as a Natura 2000 site is well monitored and maintained for any changes. The total agricultural area has decreased by 50% due to set aside, providing essential recuperation of natural resources that in turn generate indirect income through the ecosystem services provided to the region. Due vigilance and required action and prevention is apparent regarding illegal dumping. The local administration actively includes local stakeholder involvement when policies and planning for the lagoon possibly need to be revised. This is coupled with improved inter-municipality cooperation between the local authorities and communities regarding some larger or more widespread issues that could affect the lagoon including potential funding or investment bids. The need to resolve the regulatory imbalances and lack of communication channels between PL/RU regarding a number of issues as with, for example, fisheries, are underway and some benefits due to this are already evident. Agro-tourism and eco/sustainable tourism is a growing form of tourism attracting a number of longer term visitors. The number of wastewater treatment plants and sustainable farming practices has steadily increase addressing demand and water quality is very good with algal blooms now becoming a rare event.

Traditional fish stocks are improving (e.g. eel, pike-perch, and salmon) and poaching is kept to a minimum due to heavy fines, increased local awareness of its impact and the

introduction of designated no access areas retained for conservation and replenishment of stocks. The number of cormorants living and nesting in the lagoon are regularly monitored and checked. A number of schemes are in place for restocking e.g. with juvenile eel and so far are successful with some schemes being run in direct cooperation with the Russians. Local access to the S22 road leading up to the Russian border is improving. There are varying opinions, in favour and against, the plans for a cross-cut across the Spit to gain access directly to/from the sea from the Polish side.

2.4.4 Crisis

The overall population in the region has fallen by 30-35% and overall employment levels have decreased by twenty percent. Job opportunities are at an all-time low across all sectors and there is a continuous high outflow of skilled and tertiary level educated local people, particularly the under 25s. The required infrastructure for transport, fishing, industry and sustainable tourism is either in complete disrepair or non-existent with no initiatives, investment and promotion of the area.

Flood management and drainage issues are chaotic, unsupervised and uncontrolled. Conservation of the lagoon as a Natura 2000 site is neglected and illegal dumping is unmonitored, unregulated and widespread. Local administrations continue to neglect and exclude local stakeholder involvement and while inter-municipality competition between the local authorities is high, cooperation regarding some larger or more widespread issues that could affect the lagoon including potential funding or investment bids is severely lacking. Regulatory imbalances and poor communication channels between PL/RU regarding a number of issues as with, for example, fisheries, are not resolved and affect the whole social, environmental and economic health of the lagoon.

There has been a 10% decrease in the total area for agricultural use and a decrease of 25% in the utilised area of agriculture. Agro-tourism and eco/sustainable tourism have declined dramatically and the few visitors that do visit very rarely stay for more than a 1-2 days. Total nights spent by visitors has declined by 30% and there is a 60% drop in the number of bed spaces available. Water quality is very poor with frequent algal blooms. Traditional fish stocks are completely depleted (e.g. eel, pike-perch, and salmon) and poaching is widespread and not acted upon. The number of cormorants living and nesting in the lagoon is extremely high and out of control. Attempts at resuming the practice of restocking e.g. with juvenile eel are abandoned and there are no schemes or agreements in place with the Russian side of the lagoon. Local access to the S22 road leading up to the Russian border is worsening due to lack of local access and lack of maintenance. The varying opinions, in favour and against, the proposed plans for a cross-cut across the Spit to gain access directly to/from the sea from the Polish side is causing a high number of rifts and arguments between communities within the area.

3. Outputs of Final Stakeholder Workshop

How the workshops were conducted, the content of the presentations, hand-outs and posters of the scenarios followed a common plan produced by WP4 and agreed upon with the CSA partners who produced the materials used during the workshops in their native language, prior to the final workshops (see Annex III). The primary objectives of the final stakeholder workshops were to provide participants the opportunity for:

- Open discussions, deliberations on and assessment of the four different scenarios (formulated and based on WP4 analysis of FG and CJ outputs and subsequent production of qualitative storylines and population with numerical data – see D4.1; WP5 AND WP6 quantitative modelling of scenarios) presented by the project.

- Putting forward suggestions and recommendations regarding actions that in the participants' minds could be taken to either enhance or deter possible outcomes in relation to a particular scenario presented, or provide a preferred or alternative scenario for the future of the CSA.

3.1 Mar Menor

The workshop took place on the 24th of May 2014 and involved 17 participants composed of a diverse group of citizens from the municipalities that make up Mar Menor and the city of Murcia, which included: residents of the Mar Menor, researchers, business people from the area and representative of other entities (IEO). This provided a good cross section of views and opinions that reflected the diversity of connections with and uses made of the Mar Menor. Participants were invited either via email or encouraged to participate via advertised announcements of the event. Participants from the previous focus groups and citizens juries were also contacted and provided the opportunity to participate in the final workshop.

3.1.1 Outputs of final workshop – Mar Menor

An example of the scenario posters used during the Mar Menor workshop is provided in Figure 1 below. The Mar Menor workshop participants did not have a preferred scenario as their viewpoint was that all the four scenarios had certain good and bad points. Based therefore on the participants' deliberations after the presentations and their viewing and assessment of the scenarios they provided a list of recommendations that mapped out their preferred alternative scenario that could be categorised as falling into the following five main areas:

- Agriculture

- Several green buffer zones could be set up, preferably in agricultural areas close to wetlands through the purchase of land and subsequent transformation into naturalized wetland. One of these buffer zones should be located in the areas close to the end of Albujón wadi.

- Participants suggested that profits from agriculture should be reinvested in waste management (e.g. environmental management).

- Indicated water purification at farm level should be part of the farm's obligations.

- Agricultural areas bordering the protected lagoon shores should be defined as "Protected Landscape" and an agri-environment plan should be developed for improvement throughout the agricultural area of Campo de Cartagena regarding the of drawing water towards the Mar Menor. Chemical limits should also be established regarding intensive agriculture and their transformation to integrated farming systems facilitated.

- In order to reduce the silting up and loss of depth in the lagoon then excessive erosion of the banks in Campo de Cartagena should be prevented through the use of vegetation screens and other techniques.

- Adoption of measures for the protection of agricultural landscapes to avoid the proliferation of non-farming infrastructure such as industrial estates or warehouses, at least in the areas close to protected areas.

Figure 1 Example of scenario posters presented at Mar Menor workshop – Scenario ‘Set Aside’

- Natural Areas

- Proposed more environmental education and to promote widespread awareness of this unique space (to schools, neighbourhoods, universities, tourists).

- In order to enable boats dropping anchor in areas of environmental interest, such as Grossa and Farallón Islands, then berthed visiting points should be provided.

- Monitoring and control of diving in protected areas should be improved.

- Suggested an increase in surveillance and control of natural areas. They also underlined specific measures for Calblanque and Salinas de San Pedro.

- Recommended that the Natural Resources Management Plan of “Open Areas and Mar Menor and Cabezo Gordo de Torre Pacheco Islands" and its corresponding "Governing Use and Management Plan" should finally be approved.

- Adoption of appropriate management plans should be adopted, with diverse protection provided through Natura 2000 network and UNESCO, of Mar Menor's surroundings.

- Public Domain Land and Maritime Public Water should be restored (including the demolition of illegal buildings) both inside and outside protected areas.

- Maritime domain and fisheries management

- Fishing and recreational boating (jet skis and boats): funding, access, types and number of ports should be regulated.

- Comprehensive management programme for shipping and ports within the area instead of having one per localised port.

- The type of ports should be changed by removing jetty pontoons and support them instead with pillars and skirts that reflect and attenuate the wave system, allowing water circulation.

- Penalties for illegally moored boats and quick removal of abandoned boats.

- Creation of daily access areas with parking and a ramp or jetty for boats with trailers.

- Installing dry docks.

- Clean-up the seabed. Remove thousands of anchors.

- Control illegal fishing by developing joint actions between the State Government and the Autonomous Community of the Region of Murcia.

- Management and marketing of fisheries products.

- Control of jellyfish in swimming areas.

- Plan of marine protected areas or restrictions of use put in place for the preservation of habitats and species of interest and uniqueness.

- Water Management

- Main recommendation was zero discharge into the Mar Menor basin.

- Redirect discharges to Mediterranean Sea through San Pedro outfall or via the southern spillway pipe wastewater treatment plant in Cala Reona (Cartagena). Discharge should be controlled and responsible.
- Improve prediction and control of water quality. Increase analysis, according to the Water Framework Directive. Eliminate discharges of emerging substances e.g. drugs and hormones.

- Allocate some aquifer resources to irrigation thus reducing its discharge into the Mar Menor.

- Green filters (wetlands) in areas of culture to retain water runoff.

- Uptake of surface runoff from mining tailings areas and La Unión.

- Install a management system for collecting waste, bilge water and blackwater from ships in ports. This service would prevent vessels discharging their waste directly into the harbours.

- Determination of specific competences of each agency related to management of Mar Menor.

- Coordination between government and surveillance.

- A single liaison office for Mar Menor with the skills and financial means to expedite troubleshooting.

- Bottom-up planning (creating specific management bodies of the Mar Menor through Association of Municipalities).

- Zoning of beaches, so as to designate and confine the spaces reserved for swimmers and water sports equipment.

- Open a Civil Guard base, as currently there is no checkpoint dedicated entirely to the Mar Menor.

- The body under MAGRAMA basin must adopt a concrete programme of appropriate and effective measures to prevent overexploitation of the water body multilayer aquifer of Campo de Cartagena. It should prevent illegal deposits and provide exemplary punishment of the detected extractions and review concessions. This competence stems from the river basin organisation, which must be supported by available scientific knowledge.

- Perform update on discharge of brines in the basin of Campo de Cartagena, where several hundred small desalination plants have been installed for agricultural use, principally in order to detect magnitude of the problem, propose solutions and implement effective study. Regarding this issue, channelling brine discharges into artificial wetlands could contribute to the purification of water and biodiversity recovery.

- Tourism

- A paradigm shift required based on the conversion of tourism into an efficient and appropriate model system capacity.

- Urban recycling.

- Construction of boardwalks, particularly in La Manga.

- Improving the urban model in La Manga by fixing the imbalance between the dominance of few houses and hotel rooms. Since almost all the space is filled, it is recommended reclassifying parcels already built and destined for hotel use.

- Public Interest purchase and expropriation of urban land in La Manga del Mar Menor. This should include the demolition of some buildings in the area with more potential for sand recovery, prioritizing especially those bordering on the last stretches of as yet undeveloped beaches.

3.2 Ria de Aveiro

The final stakeholder's workshop in Ria de Aveiro was held on 22 May 2014 with a broad cross section (researchers, tourists, technicians and representatives of several local organizations) of 32 participants (7 women, 25 men) who were primarily inhabitants originating from the Ria's municipalities. The participants represented a diversity of interests in the lagoon, which provided a good basis for deliberation within the four heterogeneous working groups formed (see Appendix III for agreed common schedule created by WP4 regarding how the workshops should be conducted and what they should contain). Participants were invited to participate through a number of channels, including by email, or if they did not have an email address they were invited via the administrative parish. The workshop started with a plenary session including: a presentation on the LAGOONS project; an explanation of the objectives of the workshop; the methodology used in the construction of the 2030 scenarios, as well as the assumptions and the results obtained for each one of the scenarios.

3.2.1 Outputs of final workshop – Ria de Aveiro

The majority of the working groups selected the two scenarios "Managed Horizons" and "Set-aside" as a starting point to discuss the most desirable scenarios for Ria de Aveiro for the year 2030. However, the participants thought the ideal scenario should be a 5th scenario built on these two scenarios. Participants of each working group were invited to designate a rapporteur to present their recommendations. After the working sessions, each rapporteur presented their group's recommendations on how to either achieve the most desirable aspects or avoid unwanted results. Workshop participants put forward the following recommendations on how to achieve the most desirable aspects:

- Reinforcement of the lagoon's banks, where needed, using artisanal/traditional infrastructures and increase the elevation as a way of protecting the arable land.
- Use dredged material (except dredged sand, as sand was used in the past and not recommended for reinforcing the lagoon's margins) in the lagoon's margins reinforcement as a way to use up these materials.
- Optimization of arable land.
- Diversify agriculture using crops adapted to the local conditions.
- Implementation of a supplementary income to compensate farmers (land managers) for their services and for any reduction in yield resulting in their adoption of appropriate agricultural practices (e.g. regulation of the carrying capacity and the amount produced; efficient use of herbicides and fertilizers; maintenance of riparian zones; traditional rice cultivation). This supplementary income should be provided by beneficiaries and not by the state.
- Association/integration of agriculture with livestock by using natural manure instead of fertilizers.
- Optimizing existent forest area by using native species and consequently decreasing areas of monoculture, particularly eucalyptus.
- Protect areas of the Baixo Vouga Lagunar more suitable for nature conservation including keeping the density of life hedges.
- Maintenance of natural habitats and endemic species and the establishment of areas and periods of closed season.
- Considered there was no need to establish new terrestrial protected areas.

- Continued reintroduction of some native species threatened by invasive species and reintroduction of extinct seagrasses species that used to an integral part of the composition of the "*moliço*" (seagrasses + algae).
- Supervision by the competent authorities with regards to harvesting of bivalves, bait and point source discharges (specifically from industry and livestock facilities).
- Enhance sustainable and integrated tourism across the whole region and throughout the year. This would include various tourism activities, such as recreational fishing, bird watching, ecotourism, traditional boats.
- Renew the water from the Aveiro city channels.
- Timely and adequate dredging of the channels in order to maintain navigability but without damaging natural habitats such as the seagrasses "*moliço*".
- Dredging to the extremities of the channels to increase navigability.
- The past practice of harvesting seagrasses allowed the natural silting of the Ria. To emulate this then less harmful dredging techniques should be used.
- Placement of signs in the non-navigable areas of the channels.
- Collaborative and integrated management of the Ria, coordinated by a local entity within the Aveiro region (e.g. CIRA - Comunidade Intermunicipal da Região de Aveiro, *Intermunicipal Community of Aveiro Region*).
- Protection of "*salgado*" areas, such as saltpans, saltmarshes and marshes from saline water intrusion/ inundation as a way to recover aquaculture and traditional activities (e.g. salt production).
- Promote public awareness.
- Join programmes/actions of protection and recovery of Ria species or appropriate species to the area (e.g. forest - PRONATURA, bivalves - programme GEPETO).
- Increased support to (national) policy level, as at national level there is no perception of needs at local and regional levels.
- Finish the Baixo Vouga Lagunar dike.
- Improve infrastructures within the Natural Reserve São Jacinto dunes.

Proposed recommendations to avoid unwanted results for Ria de Aveiro:

- Penalise illegal fishing and bivalve harvesting in the same way as for the purchase of illegal products.
- There are areas in the Ria where the sediments contain mercury and therefore cannot be dredged.
- Minimize pressures on the seagrasses such as water velocity, pollution and excessive bait catching.
- Fewer plans needed, more concrete actions required.
- Constructions should not be allowed within the lagoon area.

Some issues presented in the resulting scenarios initiated discussion where there were varying ideas on the best solutions, including:

- Predictions regarding the maintenance or increase of the agricultural area in 2030. One group argued that with the completion of the dike the area devoted to agriculture must increase. Whereas some participants mentioned that there should not be an increase of the agricultural area, but an optimization of existing area.
- Regarding land consolidation of agricultural areas to make a more profitable agriculture - one participant reported that the land consolidation has been

accomplished, and that taking into account the size of scale, should have only a few adjustments.

- The possibility of creating protected areas within the water body.
- There were a number of views regarding restriction of the number of licenses for recreational fishing. One participant believed that the release of more licenses should not be forbidden. However another participant stated that at present the number of licenses is excessive, especially the number of recreational licenses, which can compromise fish stocks.
- There were various ideas among participants regarding the location of the dike. Some argued that it should follow the initial projected location for which an Environmental Impact Assessment was conducted (in 2001), allowing for the recovery of agricultural habitats that have been altered. Others argued that a cost-benefit analysis should be made in order to analyse the best position since there are already several degraded habitats in the current area and to also ensure the connectivity between habitats.

3.3. Tyligulskyi

A total of 24 participants consisting of NGOs, local and regional government officials, foresters, ecologists, fishermen and hunters, farmers, scientific researchers, landscape park employees and hydrologists, took part in the final workshop, held on the 29th of May 2014. As outlined in the workshop plan in Appendix III the workshop included initial presentations providing a brief overview of the project and what had been achieved so far and an explanation on the aim of the workshop, what to expect from the day and how their active participation was vital. Slide presentations were also given describing the current situation regarding the: catchments; lagoon; climate. An explanation was also provided on how the qualitative scenarios, written and developed by WP4, were formed based on issues and concerns raised and discussed during the focus groups and citizens' juries previously conducted in the CSA and how some of the socio-economic and land use data used by WP4 to populate the scenarios with quantitative data was used for modelling the scenarios by WP5 and WP6. Slide presentations were also made on each individual section of the poster for each of the scenarios.

Participants were then formed into mixed groups with a moderator/reporter per group. The groups viewed and discussed the poster presentations of each of the scenarios in their groups. A blank 'scenario' was also made available for them to use/fill out with a moderator/reporter per group to manage/take notes. A final discussion of the workshop was held with all groups the together, with a designated reporter from each group presenting their responses (including an alternative scenario if generated) to all the workshop participants. A facilitator directed and managed the resulting discussion along with a moderator and/or reporter present to jot down on a board the main points of discussion.

3.3.1 Outputs of final workshop - Tyligulskyi

Participants unanimously chose the Managed Horizons scenario (see Figure 2) but with some additions. The additions put forward were mainly concerning a gradual transition from the region's typical branches of economy at present (e.g. agriculture and fishing) to untypical or alternative ones, e.g. energy, tourism and IT.

Participants were also dissatisfied with ecologically risky activities within the Tyligulskyi lagoon area. In addition these ecologically risky activities are not always profitable (e.g. very little productivity of land) and there is a disproportional ratio of nature and ploughing lands. In the Odessa region the land ratio is 70% ploughing, 30% natural habitat which is a very high ratio even for Ukraine (50% on average). By comparison, in the EU the proportion of ploughing land is 20% on average and 16% in the USA.

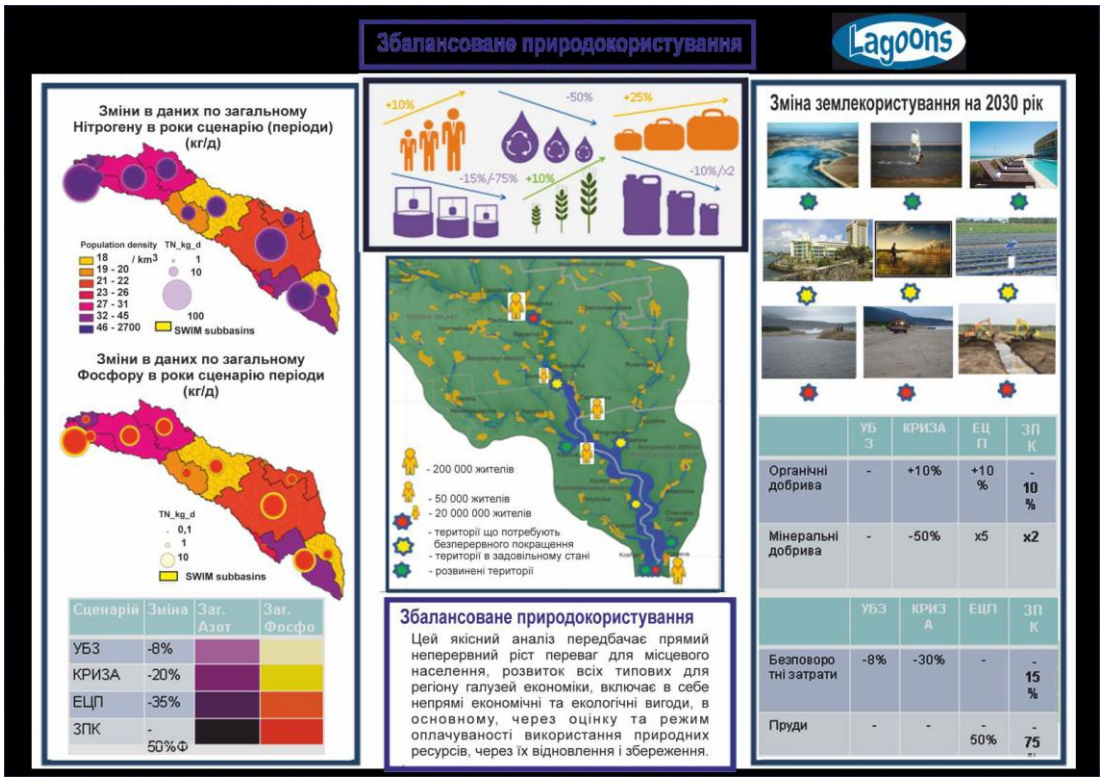

Figure 2 Tyligulskyi ‘Managed Horizons’ scenario poster presented at final workshop

Participants suggested that:

- Complex programs should be carried out to avoid wind and water erosion;
- Contour-reclamation farming should be embedded to take into account the steepness of the slopes;
- Agriculture should be more socially oriented, eco-friendly and more profitable;
- Development of alternative sources of energy (wind and solar) is encouraged;
- Two economic sectors: energy and recreation/tourism should become the leading sectors in the region;
- Curative mud is very valuable for Tyligulskyi lagoon and its sources must be protected;
- There is a strong demand for highly-qualified specialists;

- Advisable to install a gateway in the lagoon-sea channel and keep it closed for several weeks during the rainy season in order to mix all the water layers of the lagoon and thus decrease salinity.

3.4 Vistula

Due to the postponement of the final stakeholder workshop for the Vistula lagoon to July 2014 then the final outputs from that workshop could not be included in this report, as this would have further delayed the issuing of this report (and report LAGOONS 2014, D4.1) to the European Commission. Only the scenario storylines and their associated quantification by WP4 are therefore included in this report for the Vistula.

4. Summary and conclusions

The participatory process conducted during the LAGOONS project was used to provide stakeholders the opportunity for contributing their input into the process of developing and delivering possible scenarios for the future management of the CSAs within the project. Stakeholder opportunity for input culminated in the final stakeholder workshop, where they took part in open discussions, deliberations on and critical assessment of the four scenarios presented to the participants. These scenarios were formulated and based on: (i) WP4 analysis of FG and CJ outputs and subsequent production of qualitative storylines and population of storylines with numerical data; (ii) WP5's land use and climate change modelling; and (iii) WP6's lagoon modelling of the scenarios, presented to the participants.

During the final workshops participants were actively engaged in deliberations and forthcoming with their suggestions. Participants provided recommendations regarding actions that in their minds could be taken to either enhance or deter possible outcomes in relation to a particular scenario presented, or provided a preferred or alternative scenario for the future of the CSA, for instance in:

- Mar Menor participants did not have any preferred scenario as their view was that all four scenarios presented had both good and bad points. They provided a comprehensive list of recommendations, based on the scenarios presented, for their own preferred alternative scenario that addressed the following five main areas: agriculture; natural areas; the maritime domain plus fisheries management; water management; tourism.

- Ria de Aveiro participants selected the two scenarios "Managed Horizons" and "Set-aside" as a starting point to discuss the most desirable scenarios for the year 2030. However, the participants thought the ideal scenario should be a fifth scenario built on these two scenarios and provided an accompanying list of recommendations on how to achieve that goal.

- Tyligulskyi participants unanimously chose the "Managed Horizons" scenario, but with the following additions concerning: (i) the need for a gradual transition from the present forms of economy to alternative forms; (ii) addressing ecologically risky activities within the Tyligulskyi lagoon area, that in a number of instances also provide

very little in the form of income (e.g. low productivity land); (iii) provided further recommendations on how to achieve the scenario's aim.

The initial process of building and developing the scenarios and presenting the final scenarios to the stakeholders at the final workshop therefore has provided a number of ideas and recommendations regarding the actions that could be taken to either achieve desired outcomes or deter unfavourable ones by adopting corresponding strategies.

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Appendix I WP4 Quantitative Data

Quantitative Data compiled by WP4 and used: (i) To complement and quantify the qualitative storylines per scenario;(ii) as basis for modelling scenarios by Bioforsk, WP5 and WP6.

MAR MENOR									
Main Drivers	**2nd level drivers**	**Indicators**	**Data Source**	**Code**	**Baseline**	**BAU (2030)**	**Crisis**	**Managed Horizons**	**Set Aside**
Economy	Fishing/ shellfish						-50%	20%	40%
	Aqua culture						-50%	20%	0%
	GDP (PPS index)		Eurostat 2011	NUTS 1	98% of EU avg	-3.00%	-30%	10%	5%
	Tourism	Total nights spent	Eurostat 2011	NUTS 2 ES62	4573452	2%	-10%	4%	-5%
		No of bed places	Eurostat 2011	NUTS 2 ES62	49704	50%	10%	0%	-10%
Population	Numbers	Mar Menor basin inhabitants	Census 2011		355510	28%	-20%	10%	-10%
	Numbers	Total resident ppn	Eurostat 2011	NUTS 2 ES62	1472200	28%	-20%	10%	-10%
		Total ppn	Europop 2008	NUTS 2 ES62	1485000	28%	-20%	10%	-10%
	Demo graphy	Crude popn growth rate - %	EuroPop 2008	NUTS 2 ES62		13.20%	-5%	15%	-15%
		% total ppn 65 or over	EuroPop 2008	NUTS 2 ES62	13.4	30.00%	50%	20%	35%
		Employment rate 15-64 - %	Eurostat 2011	NUTS 2 ES62	54.5	-8%	-40%	20%	-15%
		Unemployment rate total yo %	Eurostat 2013	NUTS 1	26.9	8%	40%	-30%	15%
		Unemployment rate <25 yo %	Eurostat 2013	NUTS 1	56.5	40%	60%	-30%	40%

	WWTPs								
Land Use		Area total use sq km	Eurostat 2009	NUTS 2 ES62	11310	-5%	-5%	-5%	-5%
	Agriculture	Area agriculture total sq. km	Eurostat 2009	NUTS 2 ES62	5232	0%	-10%	0%	-15%
	Agriculture	Area agriculture excl fallow, kitchen sq. km	Eurostat 2009	NUTS 2 ES62	3906	-14%	-30%	5%	-15%
	Agriculture	Utilized agriculture area ha	Eurostat 2005	NUTS 2/3 ES62/0	397150	-14%	-30%	5%	-15%
	Agriculture	Fallow & abandoned land sq. km	Eurostat 2009	NUTS 2/3 ES62/0	1288	14%	30%	-5%	15%
		Crops (cereal and rice) yield 100kg per ha	Eurostat 2006	NUTS 2 ES62	12.9	40%	-15%	50%	40%
	Agriculture	Irrigation - ha total irrigable & irrigated	Eurostat 2007	NUTS 2/3 ES62/0	157120	-22%	-45%	5%	-25%
		Utilised agricultural area organic in ha	Eurostat 2007	NUTS 2/3 ES62/0	26360	120%	-20%	150%	90%
	Agriculture - livestock	Live bovine animals - numbers	Eurostat 2011	NUTS 2 ES62	573000	19%	-5%	20%	-25%
	Forest	Forestry sq. km	Eurostat 2009	NUTS 2 ES62	553	0%	-20%	5%	10%
	Hunting & fishing	Hunting & fishing sq. km	Eurostat 2009	NUTS 2 ES62	876	-5%	0%	5%	-20%
	Settlements	Population density inhabs/km2	Eurostat 2011	NUTS 2 ES62	130.4	21%	-20%	0%	-20%
	Heavy environmental impact	Heavy env impact sq. km	Eurostat 2009	NUTS 2 ES62	319				
	Services & residential	Services & residential sq. km	Eurostat 2009	NUTS 2 ES62	1344	15%	5%	0%	-15%

		No visible use sq. km	Eurostat 2009	NUTS 2 ES62	2986	-5%	10%	-5%	20%
Env protection expenditure									
	Enviro protection expenditure - total	Euro per inhabitant	Eurostat 2010	NUTS 1 ES	422				
Env protection expenditure	Industry	Percentage of GDP	Eurostat 2010	NUTS 1 ES	0.23%	-23%	-50%	10%	20%
	General government	Percentage of GDP	Eurostat 2010	NUTS 1 ES	0.30%	40%	0%	75%	150%
	Private & public env service providers	Percentage of GDP	Eurostat 2010	NUTS 1 ES	1.09%	9.60%	-20%	20%	40%
	Enviro protection expenditure - total	Percentage of GDP	Eurostat 2010	NUTS 1 ES	1.62%	9%	-40%	30%	60%

RIA de AVEIRO									
Main Drivers	**2nd level drivers**	**Indicator**	**Data Source**	**Code**	**Baseline**	**BAU (2030)**	**Crisis**	**Managed Horizons**	**Set aside**
Economy	Fishing/shellfish						-50%	20%	40%
	Aquaculture						-50%	20%	20%
	GDP	GDP (PPS index)	Eurostat 2011	NUTS 1	77% of EU avg	-10%	-50%	20%	10%
	Tourism	Total nights spent	Eurostat 2011	NUTS 2 PT16	5988216	9%	-40%	30%	9%
		No of bed places	Eurostat 2011	NUTS 2 PT16	107297	-5%	-25%	5%	-5%
Population	Numbers	Vouga river drainage basin ppn	Census 2011		961316	6%	-30%	12%	-15%
	Numbers	Ria inhabitants	Census 2011		353688	6%	-30%	12%	-15%
	Numbers	Total resident ppn	Eurostat 2011	NUTS 2 PT16	2325000	6%	-30%	12%	-15%
		Total ppn	Europop 2008	NUTS 2 PT16	2409000	6%	-30%	12%	-15%
	Demography	Crude popn growth rate %	EuroPop 2008	NUTS 2 PT16		3%	-15%	5%	-5%
		% total ppn 65 or over	Europop 2008	NUTS 2 PT16	20.50	10%	30%	0%	15%
		Employment rate 15-64 yo - %	Eurostat 2011	NUTS 2 PT16	66.10	-10%	-40%	15%	-20%
		Unemployment rate total yo %	Eurostat 2013	NUTS 1	17.60	10%	30%	-15%	20%
		Unemployment rate <25 yo %	Eurostat 2013	NUTS 1	42.10	50%	75%	-50%	50%
	Wastewater treatment					0%	-25%	10%	0%
Land Use		Area total land use sq. km	Eurostat 2009	NUTS 2 PT16	28188	-5%	-5%	-5%	-5%
	Agriculture	Area agriculture total sq. km	Eurostat 2009	NUTS 2 PT16	8416	-10%	-15%	0%	-50%
	Agriculture	Area agricultural excl fallow, kitchen sq. km	Eurostat 2009	NUTS 2 PT16	4619	-25%	-50%	0%	-50%
	Agriculture	Utilized area ha	Eurostat 2005	NUTS 3 PT161	26720	-25%	-50%	0%	-50%
		Fallow &	Eurostat 2009	NUTS 2 PT16	3619	25%	50%	0%	50%

		abandoned land sq. km							
	Agriculture	Crops (cereal & rice) yield 100kg per ha	Eurostat 2009	NUTS 2 PT16	43	30%	-20%	50%	30%
	Agriculture	Irrigation - ha total irrigable & irrigated	Eurostat 2007	NUTS 3 PT161	21620	0%	-30%	15%	-15%
	Agriculture	Utilised agricultural area organic in ha	Eurostat 2007	NUTS 2 PT16	36680	100%	-25%	125%	75%
	Agriculture - livestock	Live bovine animals	Eurostat 2011	NUTS 2 PT16	195600	-15%	-30%	0%	-50%
	Forest	Forestry sq. km	Eurostat 2009	NUTS 2 PT16	12563	0%	-20%	0%	20%
	Hunting & fishing	Hunting & fishing sq. km	Eurostat 2009	NUTS 2 PT16	16	-5%	0%	5%	-20%
	Settlements	Popn density inhabs/km2	Eurostat 2011	NUTS 2 PT16	82.4	5%	-20%	10%	-10%
	Heavy environmental impact	Heavy env impact sq. km	Eurostat 2009	NUTS 2 PT16	1165	10%	40%	-20%	-50%
	Services & residential	Services & residential sq. km	Eurostat 2009	NUTS 2 PT16	2125	5%	0%	20%	-5%
		No visible use sq. km	Eurostat 2009	NUTS 2 PT16	3903	15%	30%	-5%	50%
Enviro protection expenditure	Industry	Euro per inhabitant	Eurostat 2011	NUTS 1	37.38	2%			
	General government	Euro per inhabitant	Eurostat 2011	NUTS 1	78.41	20%			
	Private & public env service providers	Euro per inhabitant	Eurostat 2011	NUTS 1	98	200%			
	Enviro protection expenditure - total	Euro per inhabitant	Eurostat 2011	NUTS 1	213.79	100%			
Envirol protection expenditure	Industry	Percentage of GDP	Eurostat 2011	NUTS 1	0.23%	-30%	-60%	10%	20%
	General government	Percentage of GDP	Eurostat 2011	NUTS 1	0.48%	-15%	-30%	5%	20%

	Private & public env service providers	Percentage of GDP	Eurostat 2011	NUTS 1	0.67%	200%	0%	400%	200%
	Enviro protection expenditure - total	Percentage of GDP	Eurostat 2011	NUTS 1	1.38%	65%	-40%	200%	400%

TYLIGULSKYI								
Main Drivers	**2nd level drivers**		**Data Source**	**Code**	**Baseline**	**BAU (2030)**	**Crisis**	**Managed Horizons**	**Set Aside**
Economy	Fishing/shellfish						-50%	20%	40%
	Aquaculture						-50%	20%	0%
	GDP using PPP index in US$		Indexmundi	Country level 2011	7300	150%	0%	250%	100%
	Tourism	Total nights spent							
		No of bed places in Koblevo in Mykolaiv district	Report D2.1d - Tyli mezoregion		17000				
Population	Numbers	Population total Odessa oblast	UKR Demographic passport 2013		2395160	-4%	-30%	0%	-15%
		Population total Mykolaivska oblast	UKR Demographic passport 2013		1173481	-12%	-40%	0%	-20%
	Numbers	Total ppn in Kominternovskyi district	D2.1d - Tyli mezoregion		65000	-4%	-30%	0%	-15%
		Total ppn in Berezivskyi district	D2.1d - Tyli mezoregion		34000	-4%	-30%	0%	-15%
		Total ppn in Berezanskyi district	D2.1d - Tyli mezoregion		24000	-12%	-40%	0%	-20%
	Demography	Natural ppn increase Odessa oblast per 1000 ppn	UKR Demographic passport 2013		-1.9	-4%	-15%	0%	-10%
		Natural ppn increase Mykolaivska oblast per 1000 ppn	UKR Demographic passport 2013		-3.8	-12%	-40%	0%	-20%
		Natural ppn increase per Kominternovskyi 1000 ppn	D2.1d - Tyli mezoregion		-1.3	-2.50%	-15%	0%	-20%
		Natural ppn increase per Berezivskyi 1000 ppn	D2.1d - Tyli mezoregion		-5	-10%	-30%	0%	-20%

		Natural ppn increase per Berezanskyi 1000 ppn	D2.1d - Tyli mezoregion		-2.8	-5%	-15%	0%	-10%
		% total ppn 65 or over in Odessa oblast	UKR Demographic passport 2013		20	3.00%	10%	0%	20%
		% total ppn 65 or over in Mykolaivska oblast	UKR Demographic passport 2013		20.5	6%	20%	0%	25%
		Unemployment rate 15-64 - %	Indexmundi	Country level - 2011	7	125%	250%	0%	150%
		Unemployment rate Kominternovskyi %	D2.1d - Tyli mezoregion		0.5	125%	250%	0%	150%
		Unemployment rate Berezivskyi %	D2.1d - Tyli mezoregion		2.2	125%	250%	0%	150%
		Unemployment rate Berezanskyi %	D2.1d - Tyli mezoregion		3.5	125%	250%	0%	150%
	WWTPs								
		Catchment basin size km2	Lagoons BRIEF / TB4		5420				
LAND USE		Area total sq. km of Tyli mezoregion	D2.1d - Tyli mezoregion		4510				
	Agriculture	Agricultural Area total sq. km (of catchment basin)	Lagoons BRIEF / TB4		4086.68				
		Agricultural area total sq. km of Tyli mezoregion	D2.1d - Tyli mezoregion		3632				
		Agricultural Utilised area for organic farming in ha							
		Crops - sowing area km2 Kominternovskyi	D2.1d - Tyli mezoregion		819				
		Crops - sowing area km2 Berezivskyi	D2.1d - Tyli mezoregion		955				
		Crops - sowing area km2 Berezanskyi	D2.1d - Tyli mezoregion		567				
		Gross grain yield Kominternovskyi tons	D2.1d - Tyli mezoregion		124700				
		Gross grain yield Berezivskyi tons	D2.1d - Tyli mezoregion		165300				
		Gross grain yield Berezanskyi tons	D2.1d - Tyli mezoregion		92000				
	Agriculture								
		Productivity of cereals kg per ha Kominternovskyi	D2.1d - Tyli mezoregion		2480				

		Productivity of cereals kg per ha Berezivskyi	D2.1d - Tyli mezoregion		2660				
		Productivity of cereals kg per ha Berezanskyi	D2.1d - Tyli mezoregion		2260				
	Agriculture - livestock	Live bovine (cows) animals - total for Tyli mezoregion	D2.1d - Tyli mezoregion		11700				
		Live pigs - total for Tyli mezoregion	D2.1d - Tyli mezoregion		22800				
		Live goats, sheep - total for Tyli mezoregion	D2.1d - Tyli mezoregion		9900				
	Forest	Forestry sq. km							
	Hunting and fishing	Hunting and fishing sq. km							
	Settlements	Popn density inhabs/km2 in Odessa oblast	UKR Demographic passport 2013		71.9				
		Popn density inhabs/km2 in Mykolaivska oblast	UKR Demographic passport 2013		47.7				
		Popn density inhabs/km2 in Kominternovskyi	D2.1d - Tyli mezoregion		46.6				
		Popn density inhabs/km2 in Berezivskyi	D2.1d - Tyli mezoregion		21				
		Popn density inhabs/km2 in Berezanskyi	D2.1d - Tyli mezoregion		17.4				
	Heavy environmental impact	Heavy env impact sq km							
	Services and residential	Services and residential sq km							
		No visible use sq. km							
Env protection expenditure									
	Enviro protection expenditure - total	UAH per inhabitant							
Env protection expenditure	Industry	Percentage of GDP							
	General government	Percentage of GDP							
	Private and public env service providers	Percentage of GDP							
	Enviro protection expenditure - total	Percentage of GDP							

VISTULA (Poland)									
Main Drivers	**2nd level drivers**		**Data Source**	**Code**	**Baseline**	**BAU (2030)**	**Crisis**	**Managed Horizons**	**Set aside**
Economy	Fishing/shellfish						-50%	20%	40%
	Aquaculture						-50%	20%	0%
	GDP using PPS index		Eurostat 2011	NUTS 1	64	74%	-5%	85%	80%
	Tourism	Total nights spent	Eurostat 2011	NUTS 2 PL62	2470096	54%	-30%	80%	54%
		Total nights spent	Eurostat 2011	NUTS 2 PL63	5689466	12%	-30%	30%	12%
		No of bed places	Eurostat 2011	NUTS 2 PL62	37722	-44%	-60%	0%	-44%
		No of bed places	Eurostat 2011	NUTS 2 PL63	80178	-34%	-60%	0%	-34%
Population	Numbers								
	Numbers	Total resident ppn	Eurostat 2011	NUTS 2 PL62	1453211	-3.0%	-35%	3%	-20%
		Total resident ppn	Eurostat 2011	NUTS 2 PL63	2279500	3.0%	-30%	6%	-20%
		Total ppn	Europop 2008	NUTS 2 PL62	1425000	-3.0%	-35%	3%	-20%
		Total ppn	Europop 2008	NUTS 2 PL63	2223000	3.0%	-30%	6%	-20%
	Demography	Crude popn growth rate - %	EuroPop 2008	NUTS 2 PL62		-1.5%	-15%	1%	-10%
		Crude popn growth rate - %	Europop 2008	NUTS 2 PL63		1.4%	-10%	1%	-10%
		% total ppn 65 or over	Europop 2008	NUTS 2 PL62	11.8	90%	200%	45%	120%
		% total ppn 65 or over	Europop 2008	NUTS 2 PL63	12.3	70%	150%	35%	100%
		Employment rate 15-64 - %	Eurostat 2011	NUTS 2 PL62	54.9	22%	-20%	35%	5%
		Employment rate 15-64 - %	Eurostat 2011	NUTS 2 PL63	59.1	22%	-20%	35%	5%
		Unemployment rate total yo %	Eurostat 2013	NUTS 1	10.7	4%	100%	2%	4%

		Unemployment rate <25 yo %	Eurostat 2013	NUTS 1	27.5	70%	100%	30%	60%
	Waste water treatment	Population served by wwtp	PL Gov Stats 2012	W-MAZURSKIE	1064891				
		Industrial and municipal wwtp	PL Gov Stats 2012	W-MAZURSKIE	249				
		Population served by wwtp	PL Gov Stats 2012	Pomorskie	1873934				
		Industrial & municipal wwtp	PL Gov Stats 2012	Pomorskie	221				
Land Use		Area total use sq. km	Eurostat 2009	NUTS 2 PL62	24010	-5%	-5%	-5%	-5%
		Area total use sq. km	Eurostat 2009	NUTS 2 PL63	18171	-5%	-5%	-5%	-5%
	Agriculture	Agricultural Area total sq. km	Eurostat 2009	NUTS 2 PL62	11416	5%	-10%	0%	-50%
		Agricultural Area total sq. km	Eurostat 2009	NUTS 2 PL63	8276	5%	-10%	0%	-50%
	Agriculture	Area excl fallow, kitchen sq. km	Eurostat 2009	NUTS 2 PL62	10628	25%	-25%	30%	-50%
		Area excl fallow, kitchen sq. km	Eurostat 2009	NUTS 2 PL63	7782	20%	-25%	25%	-50%
	Agriculture	Utilized area ha	Eurostat 2007	NUTS 2 PL62	933850	25%	-25%	30%	-50%
		Utilized area ha	Eurostat 2007	NUTS 2 PL63	733560	20%	-25%	25%	-50%
		Fallow & abandoned land sq. km	Eurostat 2009	NUTS 2 PL62	747	-25%	100%	-30%	50%
		Fallow & abandoned land sq. km	Eurostat 2009	NUTS 2 PL63	366	-20%	100%	-25%	50%
		Crops (cereal & rice) yield 100kg per ha	Eurostat 2009	NUTS 2 PL62	35	40%	-40%	50%	40%
		Crops (cereal & rice) yield 100kg per ha	Eurostat 2009	NUTS 2 PL63	36	45%	-45%	55%	45%
	Agriculture	Irrigation - ha total irrigable and irrigated	Eurostat 2007	NUTS 2 PL62	16630	140%	-20%	200%	75%
		Irrigation - ha total irrigable and irrigated	Eurostat 2007	NUTS 2 PL63	7790	-12%	-30%	0%	-25%
		Utilised agricultural area	Eurostat 2007	NUTS 2	16460	200%	-50%	500%	400%

		organic in ha		PL62					
		Utilised agricultural area organic in ha	Eurostat 2007	NUTS 2 PL63	12090	100%	-50%	250%	200%
	Agriculture - livestock	Live bovine animals	Eurostat 2011	NUTS 2 PL62	435000	40%	0%	50%	-20%
		Live bovine animals	Eurostat 2011	NUTS 2 PL63	187900	-15%	-30%	0%	-40%
	Forest	Forestry sq. km	Eurostat 2009	NUTS 2 PL62	7168	0%	-20%	5%	25%
		Forestry sq. km	Eurostat 2009	NUTS 2 PL63	6353	0%	-20%	5%	25%
	Hunting & fishing	Hunting and fishing sq. km	Eurostat 2009	NUTS 2 PL62	595	-5%	0%	5%	-10%
		Hunting and fishing sq. km	Eurostat 2009	NUTS 2 PL63	186	-5%	0%	5%	-10%
	Settlements	Popn density inhabs/km2	Eurostat 2011	NUTS 2 PL62	60.1	4%	-15%	6%	-20%
		Popn density inhabs/km2	Eurostat 2011	NUTS 2 PL63	124.5	9%	-15%	14%	-10%
	Heavy environmental impact	Heavy env impact sq. km	Eurostat 2009	NUTS 2 PL62	465	5%	40%	-20%	-50%
		Heavy env impact sq. km	Eurostat 2009	NUTS 2 PL63	455	5%	40%	20%	-50%
	Services & residential	Services & residential sq. km	Eurostat 2009	NUTS 2 PL62	2170	-5%	-20%	5%	-10%
		Services & residential sq. km	Eurostat 2009	NUTS 2 PL63	1301	5%	-20%	10%	-5%
		No visible use sq. km	Eurostat 2009	NUTS 2 PL62	2196	5%	15%	-5%	50%
		No visible use sq. km	Eurostat 2009	NUTS 2 PL63	1600	5%	15%	-10%	50%
Env protection expenditure	Enviro protection expenditure - total	Euro per inhabitant	Eurostat 2010	NUTS 1 PL	299				
Env protection expenditure	Industry	Percentage of GDP	Eurostat 2011	NUTS 1	0.81%	-18%	-60%	10%	20%
	General government	Percentage of GDP	Eurostat 2011	NUTS 1	0.53%	85%	-20%	100%	120%
	Private & public env service providers	Percentage of GDP	Eurostat 2011	NUTS 1	1.16%	350%	-5%	400%	400%
	Enviro protection expenditure - total	Percentage of GDP	Eurostat 2011	NUTS 1	2.50%	100%	-40%	180%	200%

VISTULA (PL only) - Final Land Use Scenarios						
			BAU	**Crisis**	**Managed Horizons**	**Set aside**
Point sources	Population	PL 62	-3%	-35%	3%	-20%
		PL 63	3%	-30%	6%	-20%
	Tourism	PL 62	54%	-30	80	54
		PL 63	12%	-30	30	12
	Industry		0	-10	10	10
	livestock	PL 62	40%	0	50	-20
		PL 63	-15%	-30	0	-40
	sewage treatment		10	0	50	20
Water management	water transfer	Deyma	0%	0%	0%	0%
		Vistula	0%	0%	0%	0%
Fertilizers	crop yield	PL 62	40	-40	50	40
		PL 63	45	-45	55	45
	organic farming	PL 62	200	-50	500	400
		PL 63	100	-50	250	200
	min fert.*		10	-10	200	200
	org fert.*		10	0	300	300
	crop					
Land use	agriculture	PL 62				
		PL 63				
	agriculture excl fallow	PL 62	1.4	-10	2	-50
		PL 63	1.4	-10	2	-50
	forest	PL 62	0	-20	5	25
		PL 63	0	-20	5	25
	fallow	PL 62			0	50

		PL 63			0	50
	meadow					
Baseline:1.5% organic farming, crop: winter wheat, yield now: 50kg/ha Nmin related to current level In Nordic countries 200 kg/ha Nmin						
Industry related to food production * To be verified by CSA partners						

Appendix II Final Land Use Scenarios

Final Land Use Scenarios (Bioforsk)

MAR MENOR - Final Land Use Scenarios					
		BaU	**Crisis**	**Managed Horizons**	**Set aside**
Point sources	Population	28%	-20%	10%	-10%
	Tourism	2%	-10	4	-5
	Industry	0	0	0	0
	sewage treatment	0	-10%	0	0
Water management	Population	28%	-20%	10%	-10%
	Tourism	2%	-10	4	-5
	irrigation area	-22%	-45	5	-25
	water transfer	according to irrigation area			
Fertilizers	crop yield	10%	-25	15	10
	organic farming	120	-20	150	90
	min fert.	0	-20	-15	-20
	org fert.	0	-20	15	20
	crop	horticulture	horticulture	horticulture	grain crop
Land use	agriculture total				
	agriculture excl. fallow	-14	-30	5	-15
	forest	0	-20	0	10
	fallow			-100	
	meadow				

RIA de AVEIRO - Final Land Use Scenarios					
		BaU	**Crisis**	**Managed Horizons**	**Set aside**
Point sources	Population	6%	-30%	12%	-15%
	Tourism	9%	-40	30	9
	Industry	0	-50	0	0
	livestock	-15	-30	0	-50
	vinery	2	-2	15	10
	sewage treatment	5	-10	10	10
Water management	Population	6%	-30%	12%	-15%
	Tourism	9%	-40	30	9
Fertilizers	crop yield	30	-20	50	30
	organic farming	100	-25	125	75
	min fert.	5	-20	-15	-20
	org fert.	10	-20	15	20
	crop				

Land use	agriculture total	-10	-15	0	-30
	agriculture excl. fallow	-25	-50	0	?
	forest	0	-20	2.5	4
	fallow	300	1600	-100	900
	meadow	77	600	-100	-10
	settlements				
Baseline: 4.3% organic farming crop: corn					

TYLIGULSKYI - Final Land Use Scenarios						
			BAU	**Crisis**	**Managed Horizons**	**Set aside**
Point sources	Population	Odessa	-4%	-30%	0%	-15%
		Mykolaevska	-12%	-40%	0%	-20%
	Tourism					
	Industry					
	livestock	cows	0	-20	20	-20
		pigs	0	-20	20	-20
		goats+sheeps	20	50	0	-20
	sewage treatment		0	-10	30	50
Water management	Population	Odessa	-4%	-30%	0%	-15%
		Mykolaevska	-12%	-40%	0%	-20%
	Tourism					
	ponds		0	0	-50%	-75%
Fertilizers	crop yield		-20	-40	0	50
	organic farming		10	-10	10	25
	min fert.		0	0	500	100
	org fert.		0	10	10	-10
	crop					
Land use	agriculture		0	0	-10	-20
	forest		0	-50	10	40
	fallow			increased		increased
	meadow				increased	
	settlements					
	Note:(Valeriy)		no change	no forest --> agriculture	corridor around Tyligul	corridor around Tyligul
Baseline: organic farming crop: winter wheat now: 11 kg/ha Nmin						

Appendix III WP4 Suggested scenario poster layout and schedule for final stakeholder workshops

General scenario posters layout and content created and suggested by WP4 for final workshop:

Common schedule used for LAGOONS final stakeholder workshop

- Welcome and introduction; provide a brief overview of the project and what has been achieved so far. Present and provide copy of workshop agenda and explain workshop's aim; what they should expect from the day and how vital their active participation in it is. It should be a fun day! (15 - 20 minutes).

- Warm-up activity (optional). Creative warm-up/icebreaker of your choosing. Or everyone could briefly introduce themselves; or ask participants to introduce themselves to their nearest neighbours. (15 - 20 minutes).

- Slide presentation describing current situation regarding the: catchment; lagoon; climate. Also briefly include in this presentation how: qualitative scenarios were formed based on issues and concerns raised and discussed during the focus groups and citizens' juries previously conducted in the CSA. Brief explanation of how some of the socio-economic data has been used for modelling the scenarios. Modelling of data by WP5 and WP6. (20 minutes).

- Slide presentation of the scenarios – presenting each individual section of the poster for each of the scenarios. (20 - 30 minutes).

Break

- Stakeholders formed into mixed groups; allocation of moderator/rapporteur per group. Try to ensure that groups are as diverse as possible to allow for different perspectives on the same issue. Ideally groups should consist of 6-8 persons, but is obviously reliant on:

  (i) Number of participants;
  (ii) Whether there will be a poster on climate change alone (10mins).

- Allocate time for each group at each poster to avoid overcrowding. Groups then:

  (i) View each of the scenario poster presentations in turn;

  (ii) Discuss the viewed scenarios in their groups (including blank 'scenario' for them to use/fill out) with a moderator/rapporteur per group to manage/take notes.

  Time you allocate for this section of the workshop is dependent on the number of posters presented and also the blank scenario/map, plus discussion time – suggest approx. 90mins. Suggestion: Posters could also be available to be freely viewed by individuals during the previous break.

Break

- Final discussion of the workshop (all groups together). The designated rapporteur from each group present their responses (including an alternative scenario if generated) in turn to all the workshop participants, with facilitator directing/managing the resulting discussion along with a moderator and/or rapporteur to jot down on board main points of discussion, compile discussion and take notes. (1 hour).

Break

- Summarise and evaluate the day. Tell participants what next regarding use of their input during the workshop and what feedback will be provided to them by the project. (15mins).

- Give out short feedback form/questionnaire and ask each participant to fill out and return form before they depart. Close of day - and a big thanks to everyone! (15mins).

Notes:

- Background information and summary of workshop content provided to participants prior to workshop.
- Hand outs on the day to include: workshop agenda; include background information; summary of workshop presentations and posters; text of scenario storylines. Provide participants with pens, notepads, sticky notes etc.
- Translated transcripts of the workshop outputs need to be provided to WP4 one week after the workshops.