The **CLIMSAVE** Project

Climate Change Integrated Assessment Methodology for Cross-Sectoral Adaptation and Vulnerability in Europe

Report on the third CLIMSAVE regional stakeholder workshop

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1. Introduction

Participatory scenario development processes have played an increasingly significant role in major climate change and environmental studies over the past few decades and already play a crucial role in adaptation assessment by providing a glimpse of the different socio-economic trends that will form the back-drop to long-term adaptation measures. Moreover, planning an adaptation measure successfully will have to take into account the uncertainty of future climate impacts. Participatory scenarios have been shown to be a useful method for incorporating this uncertainty into decision-making (Alcamo, 2008)[1].

The CLIMSAVE methodology for participatory scenario development and analysis is specifically geared towards interactive climate impact and adaptation assessment. After two previous workshops, this third workshop focused on:

- Developing climate change adaptation strategies per scenario;
- Identifying workable options across scenarios; and
- Discussing learning points from CLIMSAVE.

The CLIMSAVE scenarios have been developed up to the 2050s, with an intermediate time slice in the 2020s. The time horizon of 2055 is considered sufficient to include the impacts of climate change and the effect of several adaptation options. The methodology has been developed within CLIMSAVE and is tested in two case studies: a European case study and a regional case study based on Scotland.

The careful selection of stakeholders for a participatory scenario development process, such as undertaken in CLIMSAVE, is an important factor in the exploration of plausible futures. This selection took place before the first workshop. In order to safeguard continuity, the same group of stakeholders was invited to the second and third workshop. The group of participants who participated in the third workshop consisted of participants who had already participated in workshop 1 and/or workshop 2 and some new participants. New participants were nominated as replacements by stakeholders who could not make it to this workshop – and were briefed by these before participating. When no replacements could be found by the previous participants, then new participants were researched, selected and invited according to the principles laid out for selection earlier on in the project.

This deliverable D1.4b presents the results of the third regional CLIMSAVE workshop, which was organised in parallel with the third European CLIMSAVE workshop, which is described in D1.4a. The workshop was organised in Edinburgh on 3-4 December 2012.

[1] Alcamo, J. (ed) 2008. Environmental Futures: The Practice of Environmental Scenario Analysis. Amsterdam: Elsevier.

2. Overview of the workshop

This section provides a summary of the activities that took place during the third workshop for the regional CLIMSAVE case study. A detailed agenda can be found in Annex I and a list of participants in Annex II.

DAY 1:

The workshop started with registration, followed by presentations (re)introducing the project and the state-of-play to the participants:

- Welcome and reintroduction of the project by Professor Mark Rounsevell, University of Edinburgh;
- Overview of the workshop by Dr. Marc Gramberger, Prospex.

Following these presentations the participants were split up into four scenario groups and familiarised themselves again with their scenario. They discussed the outcomes from the Integrated Assessment Platform (IAP), reviewed the adaptation options identified during workshop 2 and discussed which options to apply in the IAP.

After lunch the participants received more information on the IAP by means of a presentation by Dr. Ian Holman (University of Cranfield). After this presentation, the participants returned to their scenario groups to further improve their strategy and explore the corresponding results of the IAP.

DAY 2:

On day two each scenario group presented their selected set of adaptation options, main strategy line and experiences of working with the IAP to the rest of the regional stakeholder panel and the CLIMSAVE research team. These presentations provided the basis for the panel to identify the candidates for robust adaptation options. After further exploration of these options in the scenario groups the group settled on a shortlist of robust options applicable to all scenarios.

After lunch, the regional stakeholder panel was united with the European stakeholder panel. One regional scenario group was teamed up with one European scenario group and could explore each other's scenario.

The workshop ended in a plenary session with a comparative analysis of the CLIMSAVE process and results for Scotland and Europe, informed by a small group discussion of their CLIMSAVE experience. After an extensive feedback session, the CLIMSAVE research team presented and discussed with stakeholders the next steps towards the finalisation of the project.

3. Scenario-specific strategies

3.1. Scenario logic

In the regional case study participants developed four scenarios. These are described below and illustrated in Figure 1:

- *Tartan Spring* is characterised by a disparate well-being and lifestyle, and a resource surplus.
- *Mad Max* is characterised by a disparate well-being and lifestyle, and a resource deficit.
- *The Scottish Play* is characterised by an equitable well-being and lifestyle, and a resource deficit.
- *Mactopia* is characterised by an equitable well-being and lifestyle, and a resource surplus.

Figure 1: Scenario logic, with the name of each scenario in the respective quadrant.

3.2. Process

The stakeholders worked in four groups, each focussing on one of the four scenarios. The stakeholders that attended previous workshops remained in the group they had joined before. The new stakeholders were divided across the four groups, ensuring a multi-disciplinary stakeholder group for each of the scenarios. In each group, the process was led by a professional facilitator. A scenario supporter from the CLIMSAVE research team was present in each group to operate the IAP, provide content support and to produce background notes on the discussion.

This report contains the discussions and remarks captured, as well as the flip charts produced during the workshop.

3.3. Tartan Spring

A number of photos of original flipcharts created during the workshop are included in this, and the following sections. These are included to display results obtained during the third regional stakeholder workshop, and ideas from the flipcharts are expanded upon.

3.3.1. Tartan Spring storyline

Towards the 2020s

After 2012, Scotland continues to be a prosperous country with a strong socio-economic middle class. All layers of the Scottish society enjoy the benefits of a strong government-led management of its (natural) resources, of which it has a large surplus. This surplus fosters prosperity in the short-term and also boosts technological innovation, which ensures prosperity over the long-term. Technological innovation leads to more efficient use of resources, the exploration of new stocks, and the possibility to turn previously low value resources into valuable ones.

The thriving engines behind this technological development are excellent schools and science centres on the one hand, and the private sector on the other hand. A whole new generation of highly educated young people takes the lead. Because of this high degree of prosperity, Scotland is increasingly seen as a good place to live. Young people immigrate to Scotland and the domestic birth rate goes up, as does life expectancy. On the other hand, elderly people migrate to Scotland for their retirement. This causes an overall ageing population. The new flock of retirees cannot join the workforce, but weighs on public finance.

Through innovation there is a massive increase in recycling activities and the use of natural resources is optimised. Also, hydrogen fuel cells are being developed successfully. As a result, Scotland meets 100% of its renewable energy targets by 2015. Moreover, a major gas find in the Atlantic helps to secure growth in Scotland for the years to come. To capture the full potential of all these technological developments the Scottish government decides to open resource access to the private sector and establish liberal market structures. As a result, by 2020 the influence of the private sector in Scotland has become very strong.

Scotland can export part of its resource surplus. Electricity is exported to Europe, while China is mainly interested in the minerals hidden under Scottish soils, such as uranium from the Shetlands. The ties with neighbouring countries that are also rich in resources are strengthened and Scotland has formal contracts with the Scandinavian countries and North America. Private companies are equally driven by cooperation.

The whole Scottish economy is essentially resource based and has a low dependence on financial resources. Human capital has become very high, and apart from its resources Scotland also exports knowledge. Multinationals invest strongly in Scotland, which is beneficial for the economy. But the other side of the coin, however, is that the Scottish government no longer has control of its resources. The multinationals have slowly become the controlling force.

Following the first immigration wave of high-skilled professionals, comes a wave of lower-skilled labourers. They strengthen the workforce and become an essential part of the Scottish economy. Meanwhile, the prosperity of Scotland influences the voting behaviour of the Scottish people for the 2014 referendum on independence. The fact that Scotland is a successful country with abundant resources convinces people to vote for independence. The Scottish people believe independence is the best way to safeguard their wealth. Resource security thus fosters independence. However, Scottish independence does not happen overnight. The outcome of the 2014 referendum sets in motion an incremental process leading to full independence by 2030.

Towards the 2050s

In the period after the referendum and before full independence, the private sector further increases its grip on society. As the private sector is already very large, it is a small step for private enterprises to offer health care plans for employees. Public and welfare state related services are also being privatised. However, the privatisation process is poorly regulated and thus safeguards are not put in place for those not able to benefit from such privately organised schemes. By 2025-2030, the welfare state ceases to exist and it is estimated that Scotland is now run by ten private enterprises controlling the main assets of the country. Because increasingly more people depend on the private sector and the services of major international companies, the social fabric erodes and the influence of the local, community level decreases.

Together with independence in 2030, a new government comes into power. From this moment the full effects of developments since the vote for independence start to pan out. The power of the private sector, together with its independence, now makes it possible for Scotland to become a major player on the global market. Scotland signs trade agreements with China on the use of critical minerals and becomes the world's major producer of uranium. It also exports water to southeast England.

On a global level, the scarcity of resources leads to an energy crisis. Prices for energy become high worldwide. Scotland, with its resource surplus feels strong enough to step out of the EU. A national currency is created, the McKrona. In the meantime, the government of Scotland attempts to face the multinationals, because the market driven society has had a number of unintended, negative consequences. Therefore liaisons are established with other resource rich countries, such as Canada, Norway, Iceland and even Russia. The EU still exists, but is not seen as a strong business partner due to its lack of resources.

The disparity between the poor and the wealthy in Scotland is more pronounced. This disparity largely arises because technological innovation makes it possible to eliminate jobs and manpower. Those that have a job still benefit from privately organised health care schemes, but a large part of the workforce services the super rich and has only limited social security, barely enough for a decent life. In addition to this, the relative prosperity of Scotland compared to the rest of Europe attracts refugees and job-seekers. For every job there are hundreds of candidates, so salaries tend to be low. Some commentators speak of a modern slave economy. As such, most people cannot sustain their standard of living. Standards in education and science cannot be sustained either. Unemployment rates increase, while social welfare decreases rapidly as there is no social safety net for those that are unemployed. A class of poor citizens emerges.

The wealthy move into eco-communities and the top 10% of Scottish multi-millionaires start living in multi-millionaire ghettos. Scotland also becomes a new tax heaven. The poor start to

feel the burden of no longer being able to benefit from the welfare state. The government (unsuccessfully) tries to regain a grip on society, but fails to do so because long lasting contracts and agreements on tax cuts for the private sector are deemed legally binding. The poorly regulated privatisation operation in the 2020s has left the Scottish treasury empty, and there are very few public resources available.

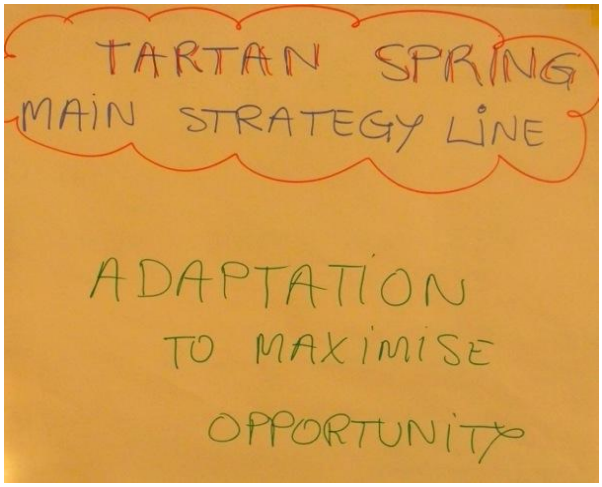
Only the wealthy can still afford to travel and access certain services. This also stimulates a large black market, run by the Scottish mafia. People are unhappy and at each election a landslide takes place. But, the Scottish Government fails to have an impact. By now, business districts with labour housing have been created by the multinationals. Nevertheless there is still pressure on the housing market, because Scotland continues to attract migrants due its resource surplus. Therefore the unemployed and new immigrants are forced to move to condensed housing surrounding the cities and main towns.

Although the country has an enormous resource surplus, there is a scarcity of food. The worldwide energy crisis has led to increasing food prices. Scotland does not produce nearly enough food to feed its ever-growing population. Together with financial pressures, social pressures rise to unseen levels. As a reaction agriculture is promoted. The poor are urged to move to the countryside to build up new rural communities.

The effects of this disparity become seriously visible by 2040. A record number of Scottish families live below the poverty line and as a result the life expectancy of the bottom 50% of Scots is around 50 years. Scottish society is characterised by an increasing wave of migration and increasing birth and mortality rates. People die from diseases that were thought to be extinct. The divide between poor and rich is 80:20, where it used to be 20:80 only 30 years ago. A Scottish middle-class is non-existent.

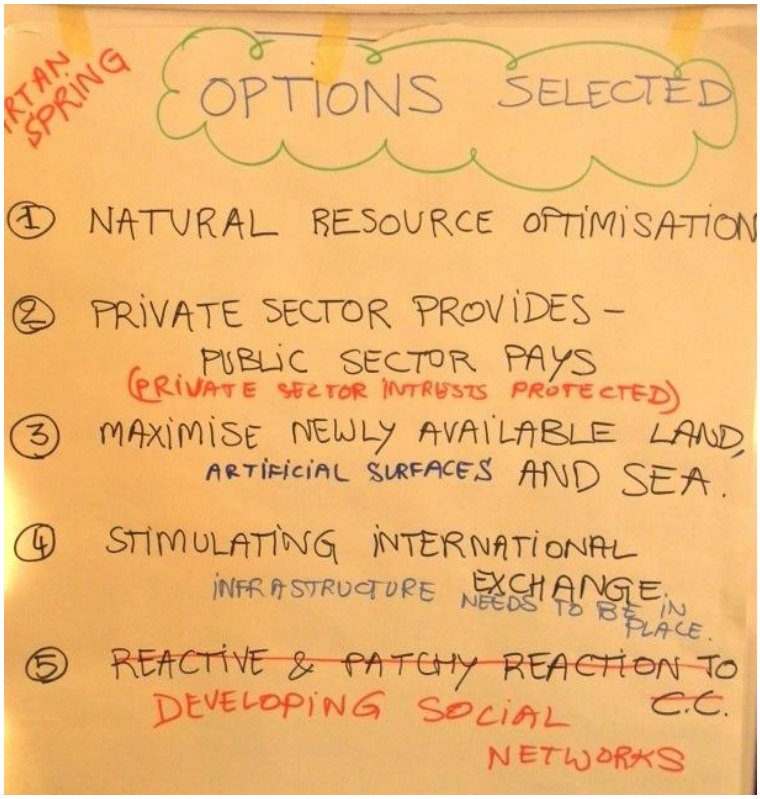
Initially, the poor were not upset because they were told they lived in a very successful country, no matter at what level they are. But this changes towards 2050 when continuous strikes and protests by the dispossessed paralyse the country. The population is heavily disappointed by the lack of sustainability and accountability of governance. In the private sector strikes and uprisings are also prevalent. The underpaid workforce is more than fed up with the dictatorship of the multinationals. In 2051, insecurity ends up in a “Tartan spring” revolution. The Scottish government is overthrown by the dispossessed. Scotland enters turbulent times.

3.3.2. Tartan Spring main strategy line



Since Scotland will not be hit that hard by climate change, in Tartan Spring we need to adapt to maximise opportunities. Good flood management and optimal agricultural yields are the basis of a successful export strategy.

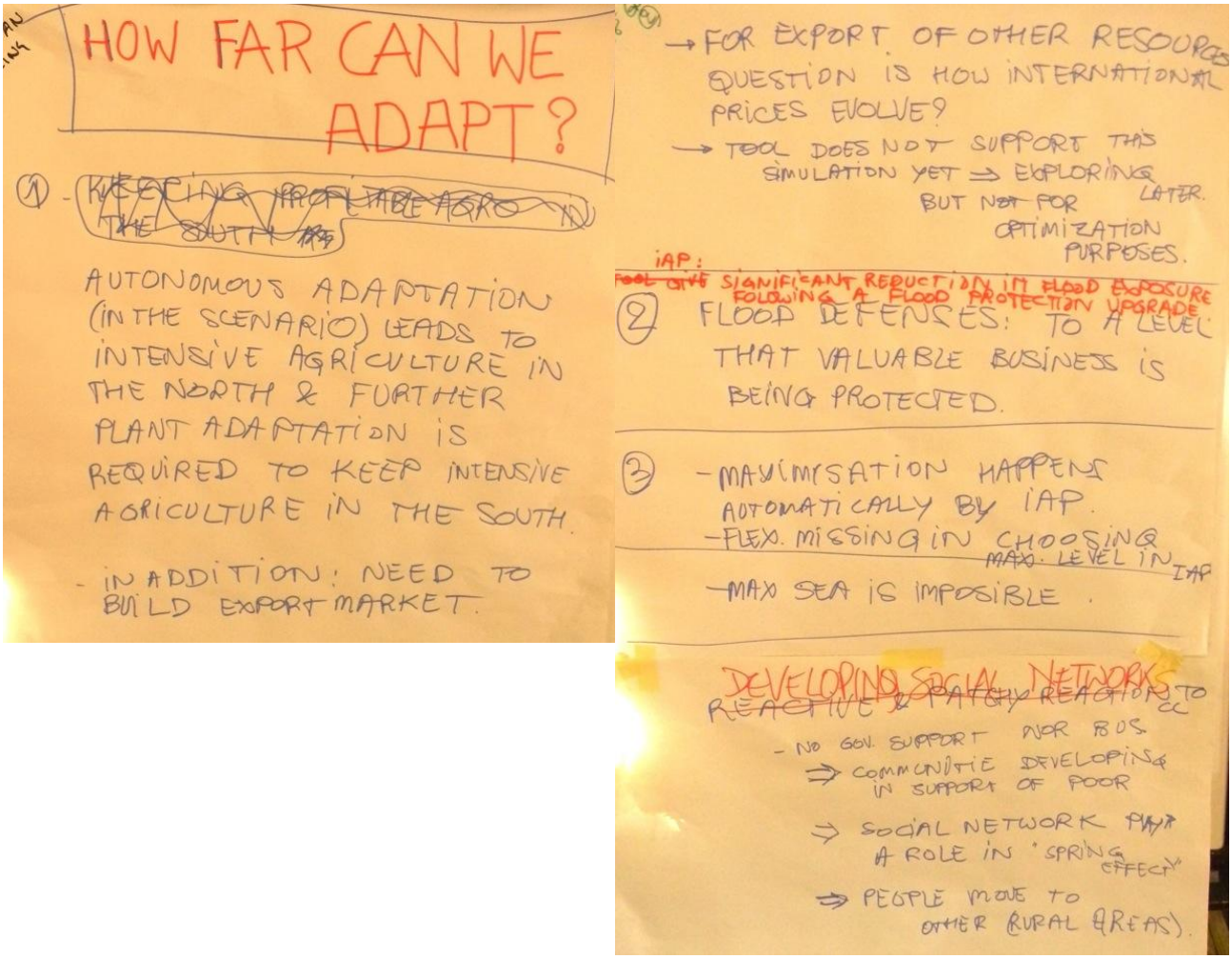
3.3.3. Tartan Spring selected adaptation options



The following describes the range of the adaptation options covered in this scenario:

- Natural resource optimisation / maximisation through innovation and technology: Energy optimisation is key.
- Private sector provides, public sector pays. The interests of the private sector need to be protected:
  - Drives flood defences and innovation;
  - Improves agriculture.
- Maximising newly available land, artificial surfaces and sea:
  - Maximise land use change;
  - Land is a valuable commodity.
- Stimulating international exchange:
  - H_2O-export;
  - Bring in skilled labourers.
- Developing social networks: This is essential for the success of Scotland - even in a disparate society, but the networks would be stratified.

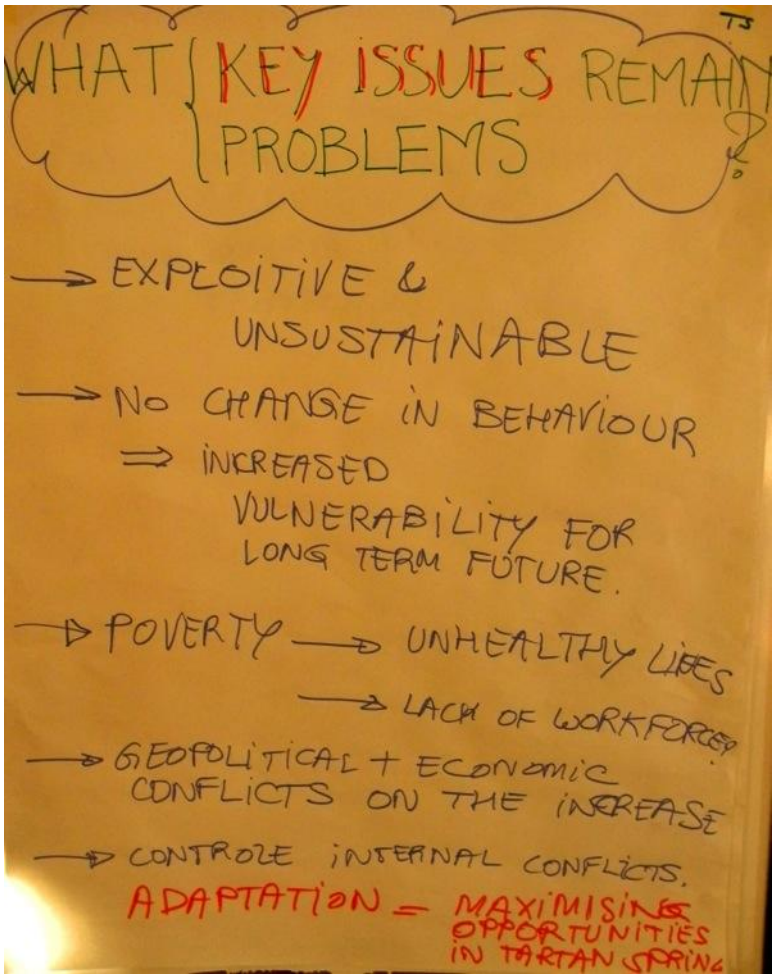
3.3.4. Tartan Spring scope of adaptation



The scope of the Tartan Spring scenario adaptation options is briefly described in the following bullet points:

- Autonomous adaptation leads to intensive agriculture in the north of Scotland and further plant adaptation is required to keep intensive agriculture in the south. In addition we also need to build an export market. For export of other resources we need a good price mechanism, because the prices have to support innovation.
- Flood defences are important to a level where valuable business is protected. A relatively small investment can already lead to a significant benefit.
- The maximisation of land use happens automatically, with more agricultural land becoming available and an intensification of the existing agricultural land.
- No governmental support (as the government is weak), nor business support for the development of social networks. Communities themselves develop support systems for the poor and the social networks play a role in the 'spring effect'.

3.3.5. Tartan Spring remaining key issues



Key remaining issues for this scenario include:

- As Tartan Spring is all about trying to maximise opportunities, this inherently means that it is exploitive and unsustainable (e.g. regarding agriculture (yields / export)).
- There is no change in behaviour with regard to climate change mitigation. Therefore we will have an increased vulnerability and more need for adaptation.
- Poverty gets increasingly worse. People lead unhealthy lives and life expectancy goes down.
- On a global scale geopolitical and economic conflicts are on the increase as other regions in the world might be interested in benefiting from the resource surpluses. Even war is a possibility.
- Also internal / societal conflicts will need to be controlled.

3.4. Mad Max

3.4.1. Mad Max storyline

Towards the 2020s

The financial and economic crisis hits Scotland in 2012, but in a more severe way than it hit Ireland a few years ago. On top of this, Scotland is confronted with a series of extreme weather events causing a poor harvest. This mix of financial crisis and extreme weather events hits the agricultural sector hard. This Perfect Storm causes a shortage in agricultural resources and volatile financial markets. Commodity speculation takes place, notably on food, land and housing. The price of a patch of land goes up, which forces landowners towards intensive land cultivation. This has an upward effect on the wheat price. The markets become very volatile, with the energy market being the most volatile market of them all. Blackouts are taking place on a weekly basis and the entire utility distribution network no longer functions. Water and food become scarce.

Increasingly more people have problems buying food and water. A hunger march is organised in Edinburgh and a few days later there is a riot in a local market over the cost of potatoes as farmers abandon the price control agreement. These commodity speculations and riots demonstrate that it is every man for himself. Because of the financial crisis and difficult economic conditions, solidarity with others is not a priority. The aim of most people is to safeguard their lifestyles at the expense of others in society during these torrid times. The cooperative system collapses, which illustrates the new self-centred paradigm of Scottish society. Some characterise this as a return to the feudal system. The steady increase in the use of private cars over public transportation reinforces this paradigm.

Energy becomes an increasingly valuable resource. In order to maximise those resources the Scottish Government sells energy to the highest bidder. As such, multinationals increase their grip on society. They own large portions of land, control the scarce water and food supplies, and determine the consistently high pricing of essential goods and commodities. These multinationals do not respect labour laws and abolish trade unions, but the government does not respond. These ruthless companies are the only ones that keep the remainder of the Scottish economy going. With them gone, unemployment rates would soar even more.

The self-centred, profit-driven system leads to a disparity between the “haves” and the “have-nots”, the rich and the poor. The “haves” have access to drinking water, health care services, energy and are able to buy patches of land, while the “have-nots” are deprived of most essential services. The “have-nots” start squatting in order to find shelter and poaching increases due to a lack of access to food. Fragmentation of society leads to more sectarianism. Conflicts between Catholics and Protestants are rampant, especially in the small mining communities in the highlands.

The whole European Union suffers from social unrest and an economic and energy crisis. Resource deficit and disparity in society are not only Scottish issues. Independence is no longer an issue in Scottish society, because there are other priorities now. Also, a Scotland that has to rely solely on its own economy and resources is destined to deteriorate even more.

By 2025, the “have-nots” organise themselves in communities of interest. They attempt to voice their grievances and hope to find protection among people facing the same challenges

and suffering the same fate. Black markets for food, water, clothes and jobs are sprouting all over Scotland and cheap labour is the only sort of employment.

Towards the 2050s

By 2030, people are looting the limited water supplies. The whole system is now characterised by short-term thinking. People have the idea that things could change overnight, so why invest in long-term solutions. A survival from day-to-day, "getting the sandbags out" type of mentality prevails over a long-term structural approach, especially for the "have-nots". The "haves" on the other hand are preoccupied with securing the few remaining resources and fortune.

The policy of the Scottish government is also based on this "just-in-time" approach. This makes it more of a crisis management team than a stable government with a long-term vision for the future of Scotland. A lack of long-term (public) investments also makes this society vulnerable to new shocks, such as energy blackouts. The health care system that was built on the principles of solidarity goes through a crisis. This is not just a Scottish problem, but a European one. Only the emerging economies, such as India and China, seem to be doing well, mostly since they have a large, cheap and eager labour force. Multinationals from Asia take hold of Scotland's remaining resources. These multinationals do not see the benefits of being sustainable. When resources run out, they just move on and exploit the next town or county.

The rich are the most resilient to shocks as they have the financial resources to adapt to crises. As a result they increase their grip on society. The rich have private health care and protest against the introduction of a national publicly financed health service. But even the rich cannot escape the volatility of Scottish society completely. Asset stripping becomes common practice amongst those on the management boards of major multinationals.

In the meantime, the pressure on the poor increases further as rising house prices force some of them to live on houseboats. Ghettos of poor people living on boats emerge just off the Scottish coast. Initially, the social cohesion in these ghettos is low, but over time religion, faith and spiritualism bring the poorer Scots closer together. Poor people also leave the central belts and move to the highlands. They look for the scarce resources so they can be self-sufficient, or they move to the areas owned by the "Haves" and the multinationals, who have reinstated a feudal system reminiscent of the Middle Ages. Multinationals own all the land suitable for mining, agriculture or forestry. Their forests and gated communities are guarded by security personnel that do not shy away from violence to keep desperate "Have-nots" out. Decision-making is in the hands of multinationals and landowners, since governance remains weak. The poor have to pay or work for the landowners to safeguard their water supply. But at least they can get access to some clean water. The poor that are left behind in the decayed cities are worse off. The network of water distribution does not exist anymore and potable water is scarce.

There is also an increased resistance to allow people to move into the region. Immigration is strongly discouraged. Both the "Haves" and "Have-nots" realise they have to organise themselves: the "Haves" to protect themselves and their property, the "Have-nots" to survive. These unions originate out of necessity. However, conflict within these groups is also common. The "have-nots", for example, are also subdivided into different strata. The worse the situation, the more this sectarianism based on culture, religion and dialect becomes. 'Clans' are ruling Scotland again, just like they did in earlier times. Some of these clans specialise themselves in organised crime and the black market is thriving.

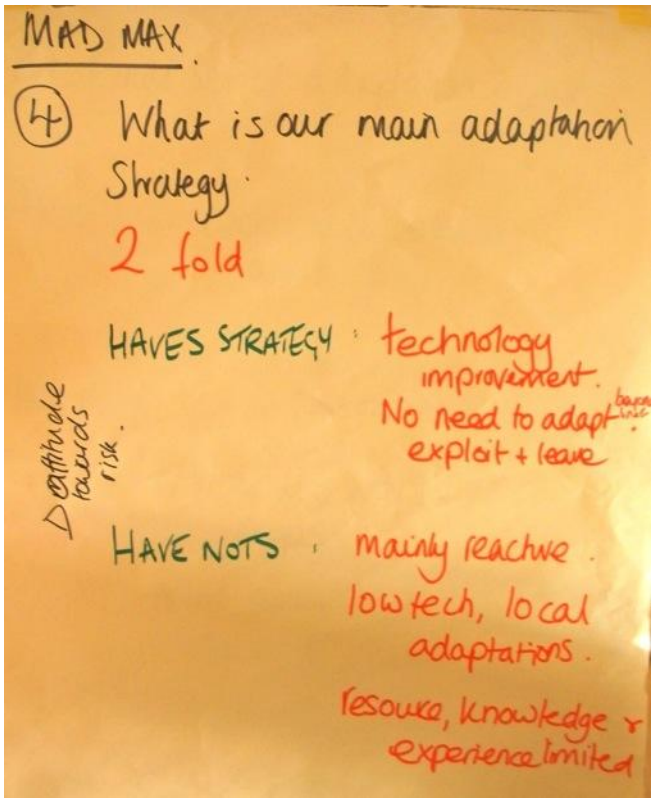
The image of a split country is reported to the rest of the world and causes a crisis in the tourism sector. Tourists are afraid of being robbed and stay away. Scotland is also facing external pressure from the EU to restore its budget deficit and to ensure a proper functioning parliamentary democracy, which does not solely serve the short-term interests of multinationals. The EU even warns Scotland to think about leaving if these issues are not properly addressed.

As of 2035 both the "haves" and "have-nots" get used to this system and learn to live with instability, albeit both in very different ways. The "haves" and "have-nots" organise themselves internally. Within each strata of society the overall situation starts to improve as the cooperatives are reinstated and a sufficient degree of innovation ensures survival. By the same token, Scotland remains inequitable and real fundamental problems between the different strata continue to exist. There is no, or very limited contact between the different strata. The poorer Scots work for the richer Scots, but that is the only interaction between them.

In 2045 a small part of the Scottish social elite comes to realise that Scotland can no longer continue to live like this. It has already missed its emission targets by 30% and the water price is over 50 pounds sterling per cubic metre. A small movement of the Scottish social elite reconsiders the historic concept of "sustainability". The movement advocates a sustainable society in which poor and rich can live in harmony with one another. However, most "Haves" are determined to sustain their position. That is why a decrease in the gap between both groups remains implausible. The multinationals adopt a Victorian approach to eliminate social unrest. They provide their work force with a better quality of life, simply because a happy workforce tends to work harder.

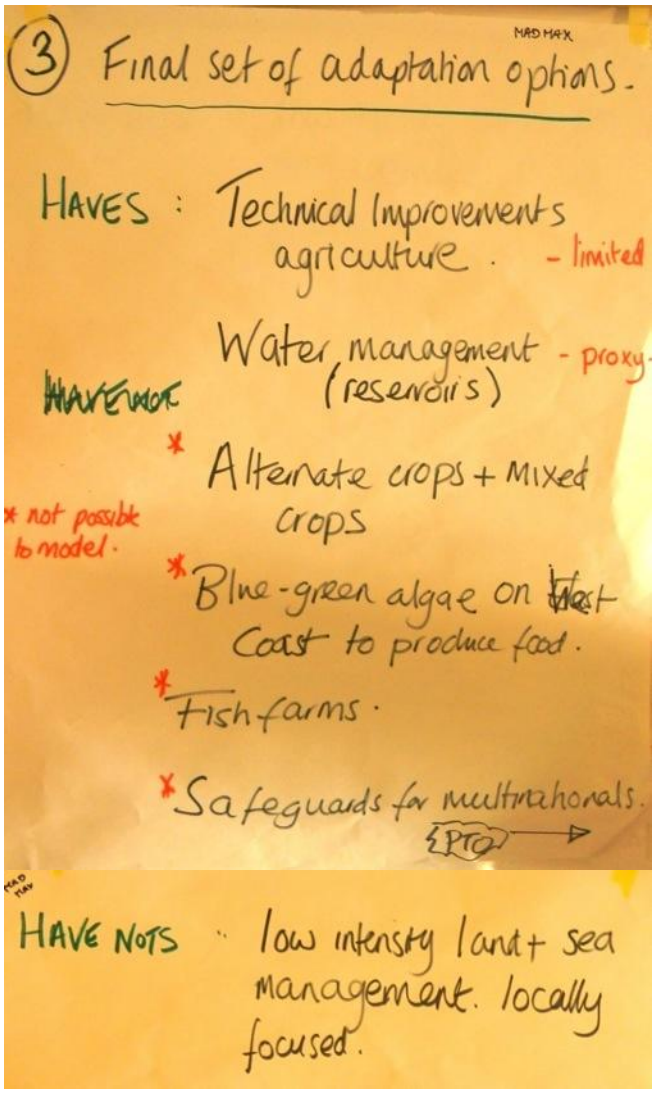
By 2050, the Scottish economy and society have somewhat stabilised. The poor are creative and earn a living by providing services to the "Haves". There is a strong demand for security guards and lawnmowers. "Have-nots" shop on the black market and bartering becomes popular. Decision-making happens on two levels: on the corporate level and on the local/clan level. The national level is still very weak and the First Minister of Scotland has almost become a ceremonial function.

3.4.2. Mad Max main strategy line



In Mad Max there is not one coherent strategy, but there are two separate strategies with different attitudes towards risks. For the "Haves" there is no real need to adapt, as they can just exploit the land and leave. For the "Have-nots" adaptation is predominantly reactive. It is low-tech and linked to the local context. People try to make the most of it given their limited experience, knowledge and resources. They have to build in a resilient attitude towards risks.

3.4.3. Mad Max selected adaptation options



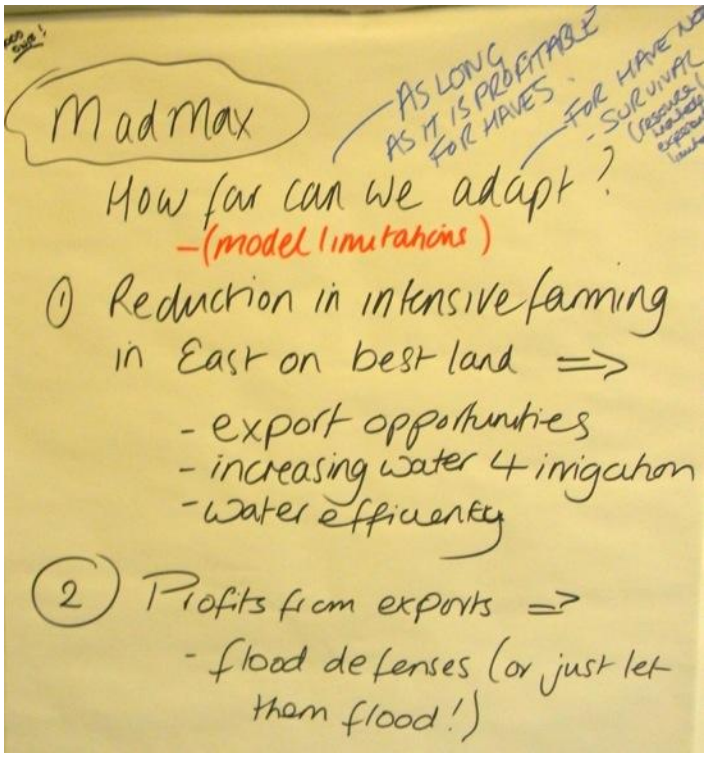
For the "Haves":

- Technical improvements in agriculture.
- Water management.
- Alternate crops and mixed crops: introduce, for example, sugar root or eucalyptus.
- Blue-green algae on the west coast of Scotland.
- Fish farms.
- (Safeguards for multinationals was dropped from the list last minute).

For the "Have-nots":

- Managing low intensity land and sea.
- Local focus: people live in clans and are resource poor. There is no free flow of information and knowledge, which limits their adaptation. But within these small communities there is a very localised form of equity.

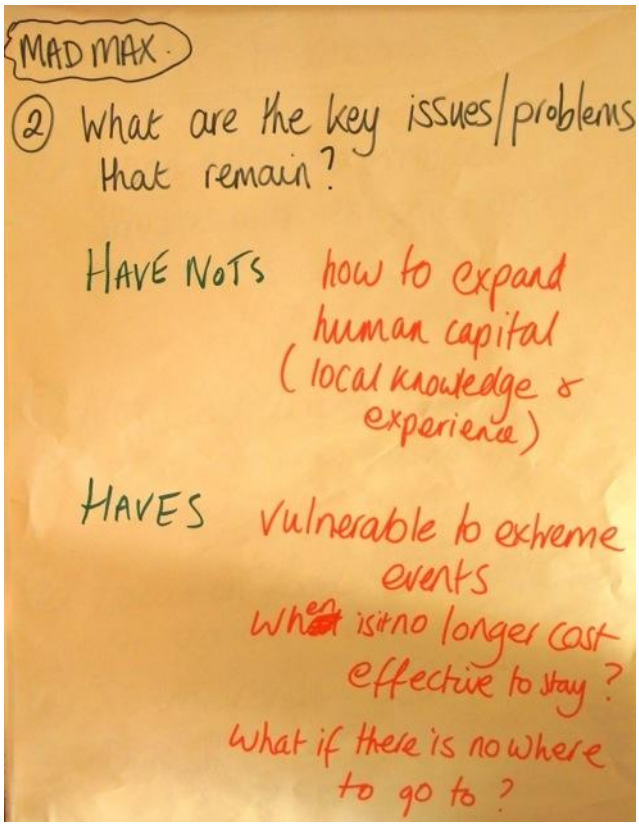
3.4.4. Mad Max scope of adaptation



The scope of the Mad Max scenario adaptation options is briefly described in the following bullet points:

- As there are two completely different systems in this scenario, there is no consistent response. For the "Haves" climate change adaptation is not an issue and for the "Have-nots" the main limitation for adaptation is access to knowledge and information.
- The key thing in maintaining a deficit is the need to supply to the export market. But if it is cheaper to produce elsewhere than adapting here, that is what you do. As the sea level rises, the "Haves" just let places flood if it has no special value to them.

3.4.5. Mad Max remaining key issues



Key remaining issues for this scenario include:

- For the "Have-nots" the key issues are related especially to expanding human and social capital.
- The "Haves" do not really care about climate change adaptation. But the one thing they are vulnerable to is exposure to extreme events - be it flooding or droughts - as they influence yields.

3.5. The Scottish Play

3.5.1. The Scottish Play storyline

Towards the 2020s

Like many other countries in Europe, Scotland feels the effects of the financial crisis and climate variability. Extreme weather events cause a number of poor harvests. The government bails out the agricultural sector by investing more money in climate change mitigation. As a result, the Scottish Government is forced to significantly cut down on public spending. Several health care programmes take budget cuts and funds for climate change adaptation are also low. At the same time, the oil price peaks, increasing the revenues for Scotland. The Scottish Government decides not to cut down on subsidies for education and invests a lot of the oil revenues in educating children, including teaching about healthy lifestyles and eating habits. Despite the crisis, all children are able to enjoy free education, while the Scottish people still have access to affordable health care.

In spite of these difficult times, the economy is still growing marginally by 2020. Scotland has some advantages over the rest of Europe. Its population is smaller, which means it still has some options regarding land use. It can partially produce its own energy. The country also has a mature economy with a focus on intellectual capacities and innovative technologies. Last but not least, the Scots take pride in their country. The response to the resource crisis and the equitability of Scottish society attracts a fair number of immigrants.

The Scottish are very supportive of the government approach and the subsidies for the agricultural sector. Agriculture is the growing core of the Scottish economy. Without barley the whisky industry would cease to exist. Moreover, the majority of the Scottish people believe in the government priorities of not cutting spending for education. A good farming education is developed with a focus on innovation and sustainability. On the other hand the agricultural sector also gives back to society by supporting industries. In the face of these difficult times the Scottish people come together to take on the challenges as a whole. The traditional Scottish values of getting on with it, no desire for excess, and sense of solidarity take the upper hand. Long-term thinking is promoted and citizens with a vision are appreciated. An absolute majority votes ‘yes’ in a referendum for autonomy. The young Scottish state is very much focused on its own strengths and looks at the Nordic countries as an example. The bond between Scandinavia and Scotland becomes stronger and they exchange best practices.

By 2018, the crisis starts to affect the fishery industry and further crop failures occur due to droughts. Because of slow economic growth, Scotland has not invested a lot in renewable energy sources and struggles with the high cost of energy. This cost weighs on normal household budgets across the country. In spite of all this, the Scottish people manage to adapt quite well to problems in the food chain and high energy prices. Some people move to the countryside seeking a better quality of life and cheaper living costs. Self-sufficiency and farmer markets break the reign of the large supermarkets. There is a growing consumption of local produce. Life in Scotland remains attractive, mainly because the rest of the world is suffering from more severe problems.

Towards the 2050s

The key to making the Scottish people resilient lies in the education system. The decision not to cut education budgets in 2012 now pays off. People have strong confidence in the education system and the education system teaches the Scottish how to cope with changing conditions. Courses on recycling and food habits feature in the curriculum of most schools by 2025. All strata of society bear the fruit of the investments in the education system. Specific programmes focus on elevating children from poverty through education.

The education system stimulates innovation and creativity in the domains in which Scotland has been struggling for the last 15 years. New techniques are being used to provide fish farms with food, while newly graduated agronomists now manage to cultivate land which was previously uncultivated due to climate change. Because of the education system the Scottish make better use of what they have and try to adjust to things they don't have. Car owners trade in their cars for free bus passes for the entire family. Health care services are restrained, but because people are better educated they live healthier lifestyles which reduces demands on the health system. People also live longer. Immigration into Scotland means that the population is growing. The equitable Scottish mindset does not expect people to assimilate, but to integrate. The right of immigrants to celebrate their traditions makes them a relatively happy, productive workforce.

By 2035, pretty much all Scots have learned to cope with difficult and quickly changing living conditions. By now they know that a modest approach, together with a strong social fabric, will help them through the toughest of times. Only a handful of Scots defect from this and still have an unhealthy lifestyle and drive powerful 4x4s. The Scottish consumption pattern has changed due to the growth of "Factor 4" economies. The amount of waste is reduced, because things are now built to last. The three 'R's' – Reduce, Re-use, Recycle – have become the motto of the Scottish economy. The economy has developed into an example for the rest of Europe. It is a service-driven and resource protective economy, focused mainly on the export of high-value products and services.

After 10 years of relative sustainable growth, extreme weather events lead again to resource shortages and crop failure. Again people need to adjust their diets. By now Scots are used to the state of flux and adapt quite easily. Deliveries of fossil fuels through pipelines are no longer taking place on a daily basis. Despite a strong emphasis on recycling and renewables, these renewables (notably solar energy and hydro power) have not lived up to the expectations sufficiently. The renewable energy sector grows, but energy remains expensive and its distribution limited. The Scottish government now pins all its hope on wind power. But wind power also fails to deliver.

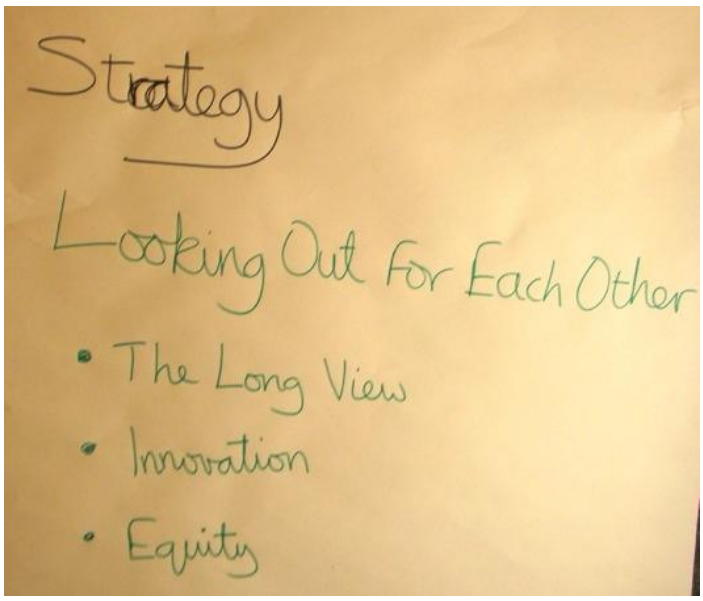
By 2050 the Scots have learned to adapt to changing situations. Communities are coming together in the face of recurring economic troubles, natural hazards or extreme weather events. Economically there might be losses, but a strong degree of social capital mitigates this effect. There is a reinstatement of the national service. People are enthusiastic about giving something back to society. They have received an excellent free education and feel the need to serve their country in return. This national service is not focused on the military, but includes volunteering in homes for the elderly, engineering, construction, etc.

National service is inherently linked to the pride the Scottish feel in their country. However, this pride does not translate into independence for Scotland, but rather into regional autonomy within Scotland. It is now subdivided into 'Clantons', with the Swiss model of governance as

an example. These ‘Clantons’ are in effect structured communities. They function through the idea of collectiveness, however, they are not always democratic. The referendum is not as common in Scottish decision-making as it is in Swiss decision-making. Even though the ‘Clantons’ have a decent amount of autonomy, decision-making in domains such as education or technology remains exclusively at the national level.

Outside of Scotland, countries lack the necessary flexibility to deal with natural hazards. This leads to political unrest in some European countries. In contrast, the adaptability of its population and the focus on education and innovation have made Scotland one of the better places to live. Education, research and agriculture are three of the main areas of employment. But Scots also excel in engineering, marketing and services. The Scottish population may be poorer than a few decades ago, but they are also greener and happier.

3.5.2. The Scottish Play main strategy line



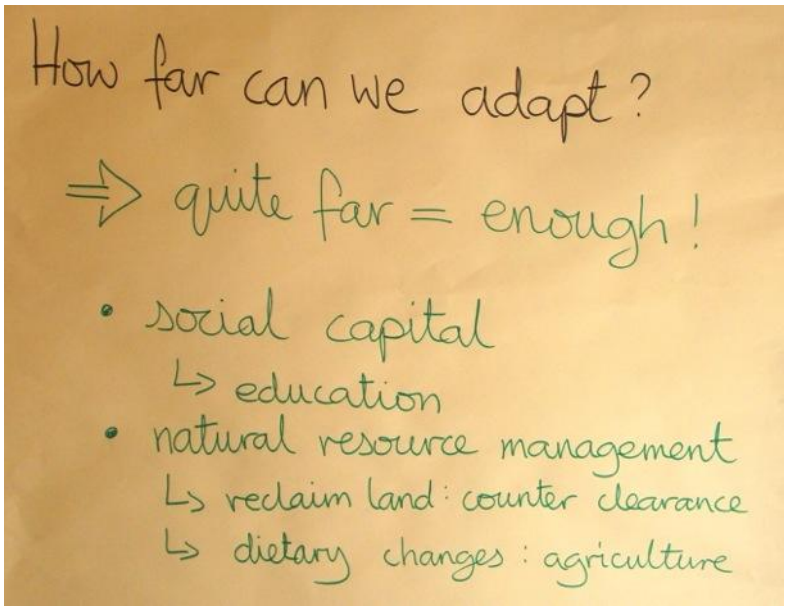
The main strategy in The Scottish Play is to look out for each other. The public is very supportive of the social policy and equitable approach. Knowledge and education equip people and society as a whole with the tools to adapt.

3.5.3. The Scottish Play selected adaptation options

The following describes the range of the adaptation options covered in this scenario:

- Even though there is not much money available in The Scottish Play it is important to invest in education. This will help society in the long view. All communities work together to achieve this and share information and best practices.
- Urban space should be used optimally and urban green spaces have to be created. The space around buildings can be used for allotments, green roofs can be designed and the aim is multi-occupancy of buildings. Urban 'Clantons' can be twinned with rural 'Clantons' that have a lot of available land.
- Water management is important and wasting water is avoided. Instead it can be used for fish farms, hydro-energy and recreational purposes.
- Land is owned collectively by a community rather than by multinationals and the use is multifunctional and flexible (heterogeneous).
- All levels of governance work together, so a smart devolution is achieved and decision-making can be passed down to the local level. A national strategy is still needed, but there is an overall agenda of localism, also regarding economics. People are encouraged to spend their money locally.

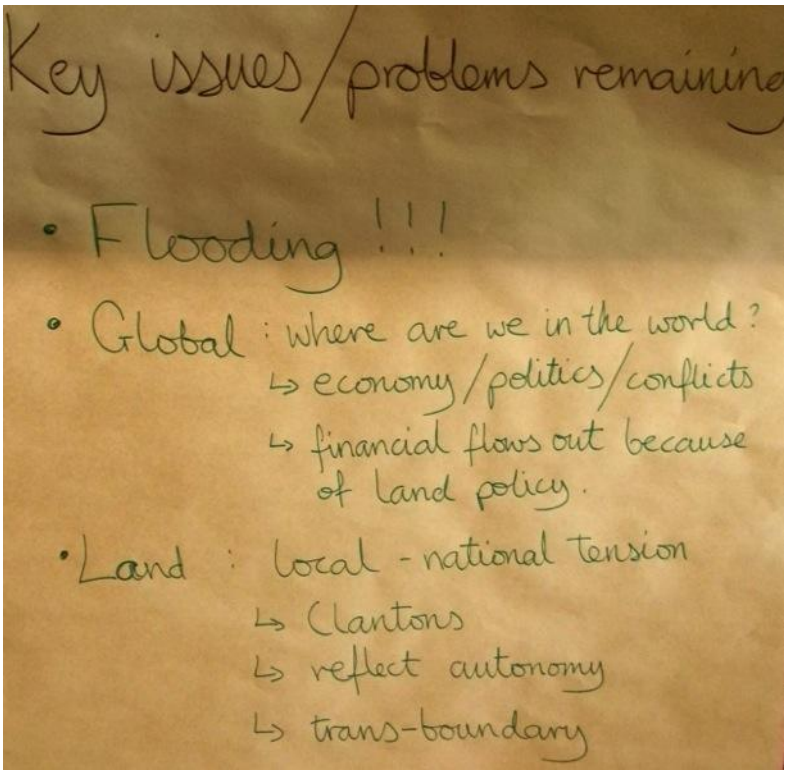
3.5.4. The Scottish Play scope of adaptation



The extent to which adaptation can be achieved in this scenario is described below:

- In The Scottish Play adaptation is very good because of the social resilience of society. There is also a much greater sense of community and the focus on education strengthens the social cohesion.
- They is no building of flood defences (as there is no money), but instead there is more physical mobility to deal with the changing climate. This shows that social capital is much more important than financial capital

3.5.5. The Scottish Play remaining key issues



There are a number of key issues associated with this scenario which remain. These are as follows:

- Flooding remains a big problem. Even when covering the whole of Scotland with forests, there were still a lot of floods according to the IAP.
- We have not figured out where we are in relation to the rest of the world. Are we exporting or not? Are we part of the European Union or not? Are we still part of the Common Agricultural Policy? Are people trying to invade us? These are all questions that remain. But we do anticipate financial flows (foreign investments) leaving the country, because we are doing this counter clearance. We are throwing rich individual landowners from the land to claim it for ourselves.
- The local – national issue is not resolved yet in terms of governance. Who owns the land? The government or the Clantons? Are cities Clantons or not and what is the role of a Clanton? How do we reflect autonomy? We are equitable, but what happens when one Clanton dumps their waste in the river and a Clanton downstream has to deal with the waste problem? These trans-boundary issues remain.

3.6. Mactopia

3.6.1. Mactopia Storyline

Towards the 2020s

In 2012, Scotland takes a conscious decision to embrace the concept of equitable development. To live up to this commitment Scotland makes some important and big decisions to make the concept work for its people. At the Inverness conversations, which gather representatives from all layers of society, it is decided that oil will be phased out as an energy source in Scotland in favour of renewable energy resources such as hydropower. Moreover, a plan to give all Scottish citizens broadband internet is approved in the Scottish Parliament. There is a strong social contract with the Scottish people to take up such technological innovations. This plan creates the possibility for teleworking and increases the level of information for all citizens of Scotland.

Many of the transitions towards an equitable and sustainable society require strong regulation from the government. But because the whole of society is behind the transition to an equitable society, it is widely supported and local communities also contribute to the transition. By the same token, harsh penalties are attributed to those households not switching to renewable energy sources. Some pockets of the population do not agree with this lack of choice, but most primarily see the advantages of strong government policies. The number of poor people goes down year after year and a large and solid middle class is the driver of the economy. Even though the rich are taxed severely, most of them decide to stay in Scotland. They also realise that a more equitable society is a safer society. Scots also perceive climate change as having a positive impact on their lives, thanks to strong mitigation and adaption actions.

This evolution towards equity comes at the backdrop of positive economic development and a further political separation from the UK. The few years of economic and financial turmoil are now firmly behind Scotland and thus resources become available to make this transition possible. Strong devolution from the UK gives Scotland the autonomy it needs to make the transition towards an equitable society possible. The legal system becomes more European over time. This leads to planners no longer allowing people to build houses in flood risk zones

in Scotland, since the planner can be sued if a newly built house gets flooded. This additional personal liability is extended to all levels of society, including Ministers.

Social justice has become a key term in law in the same way as accountability has become a key term in government. Scotland also puts the payment of flood risk subsidies to London on hold. The Scottish remain strongly linked with the European Union, but meanwhile they also strengthen the connection with the Scandinavian countries. By 2020 Scotland has joined the Nordic Council and best practices are exchanged between the different countries which have similar economies and a similar philosophy with regard to equity.

Additional incomes are generated by the Scottish government from the selling of resources such as water, of which Scotland has a surplus. Because of its comparative advantage over others in the field of water, it can obtain good trade agreements with other countries on innovative resources such as information technology. Trade agreements are made between Scotland, Brazil and the other BRICs without British interference.

For small and medium businesses the costs tend to increase, but these are more than outweighed by the benefits of a resource surplus. More and more companies are encouraged by the government to relocate to Scotland. Since the Scottish economy is one of the healthiest worldwide and innovative companies make Scotland their stomping ground, highly educated Scots no longer emigrate. On the contrary, many Scottish ex-pats return to their home country. The industry is focused on innovation and technology. There is government support for research, development and innovation. The long-term investments in education are also paying off and Scotland becomes a frontrunner in trading resources as well as the intellectual property surrounding it.

The strong economy and equitable lifestyle of Scotland attracts many immigrants from throughout the European Union and beyond. Unlike the previous wave of immigration, they now also move into rural areas of Scotland and immigration is not limited to the larger cities. This has a positive effect on small town economies, but the influx also puts pressure on local communities, which leads to some nationalistic attitudes in the years to come. In some parts of Scotland the Scottish and immigrant communities are fairly divided, but there also more cosmopolitan areas.

Towards the 2050s

The export of water and other products increases the global role of Scotland. A part of the profit of selling the resource surplus is invested in a Sovereign Scotland fund. This fund gives Scotland on the one hand the possibility to ensure the well-being of its population, regardless of its social status, and on the other hand the resources to invest in innovation and other sustainable investments, such as a reforestation programme which would cover 25% of Scotland by 2025, a very extensive railway network by 2030 and research programmes to boost innovation in the field of renewable energy and IT.

Scotland begins to play an important role in services worldwide, diversifying away from natural resources because the government realises that these can run out. Therefore a lot of investment goes into education and innovation to secure a stable economy for the decades to come. There is also a boom in small and medium sized enterprises. Scotland becomes a frontrunner in IT, life sciences, green technology and finance.

Resource abundance, and its benefits, bring about the realisation that it would be good to be an independent country, as it would help Scotland to grow even more in the future. A further step is its own currency, which is linked to the Norwegian Krona. Scotland has by now developed strong independent links with other EU countries. It attempts to play an important role in decision-making on the European level and provides key personnel for the different EU bodies. One of its biggest achievements in the political arena is the EU Environmental Framework Directive, which was advocated by Scotland to ensure an integrated regulatory system for land and water management.

From the 2030s all new buildings have to be energy neutral and all households have to be on smart grids. This green push does have some disadvantages. Scotland has become highly dependent on renewable energy and transmission systems, since oil and gas are phased out as an energy source and nuclear power is also largely abandoned. This makes Scotland vulnerable and solar storms are feared. Tax evasion also increases in a heavily taxed Scotland, as do illegal activities such as the smuggling of water outside of Scotland to other parts of the world.

Climate change, however, also has a number of positive effects on Scotland. The share of land for agriculture in eastern Scotland increases due to a warmer climate. The warmer climate also attracts more tourists to Scotland. The Sovereign Scotland fund now bears fruit, by buffering down turns in the global economy.

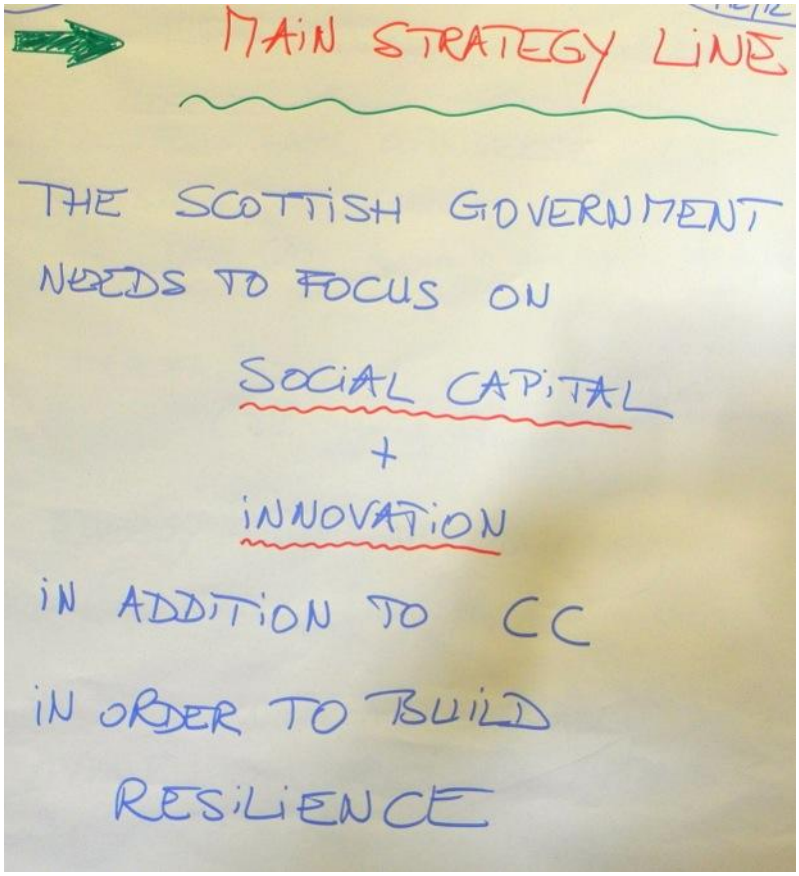
By 2035, Scotland attracts even larger numbers of immigrants, notably coming from England. They are encouraged to settle in the west and in rural locations to perform cheap labour. Strong assimilation measures for immigrants are taken. In some parts of Scotland Gaelic language courses are compulsory in school, also for immigrants. They are not forced to speak Gaelic, but they are educated in Scottish tradition. Scotland also works together with the other countries in the Nordic Council to obtain exceptions from the EU freedom of movement. A minority of Scots feel threatened by this wave of immigration and the media reports on nationalist terrorists attacking immigrants.

The – often highly educated – immigrants may not always receive a warm welcome, but they prove to be extremely valuable. They help to reinvigorate the communities they move to in west and central Scotland. This fuels further development and enhances the health of the local population. Due to this move to rural areas, many villages become larger rural towns over time with more facilities. The local communities are so strong that a new type of governance is adopted: communitarianism. The Scottish identify themselves strongly with their local community. They except much from it, but also give back.

In 2040, Scotland is shocked when a Scottish water tanker is hijacked on the way to the Mediterranean to deliver drinking water. This event plus a resource war in Africa and South America leads Scotland to rethink its national security strategy in view of the ever more visible threats from countries which have a resource deficit. The strategy aims to protect all the resources Scotland has; not only commodities, but also its biodiversity and variety of species. But because Scotland is firmly attached to values such as equity and solidarity the protection of its resources does not happen by having an inwards/protective attitude. Establishing healthy trade relationships with rich countries, as well as helping with the (economic) development of poor countries should enable those countries to develop sufficient resources themselves and to keep them at bay.

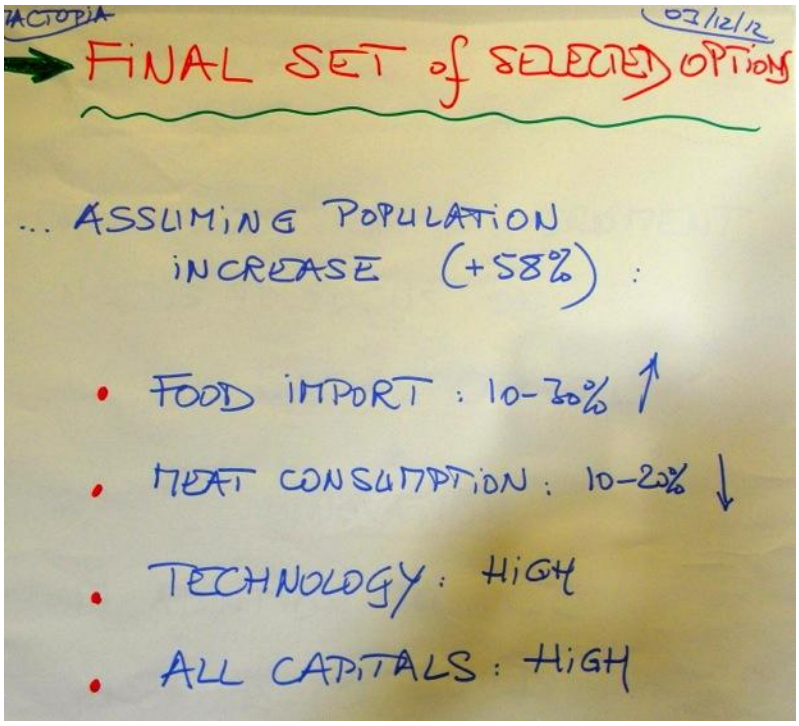
By 2050, this protective stance has a number of unintended effects. Some remote communities do not buy into this way of life. They like the feudal or clan system and don't want to change. At the other end of the spectrum, some Scots are fed up with the highly regulated society and the fact they are no longer able to live their hedonistic lifestyle. Satellite Scottish hedonistic communities move to the wide-open spaces and forestland of eastern Europe, where they can enjoy their alternative lifestyle in peace. At the same time tax exiles move to London or other major European cities. Although there is some discontent, these are all events at the fringes of Scottish society. By 2055 the Scottish population peaks at 7.5 million, but homelessness hits zero. The rich may have become slightly less rich, but poverty is almost eradicated and a powerful middle class now takes the lead in Scotland.

3.6.2. Mactopia main strategy line



In Mactopia the government needs to focus on social capital and innovation in addition to climate change in order to build in resilience. It turns out that even under extreme climate conditions – be it wet and cold or dry and hot – we can adapt, provided we have social capital and innovation.

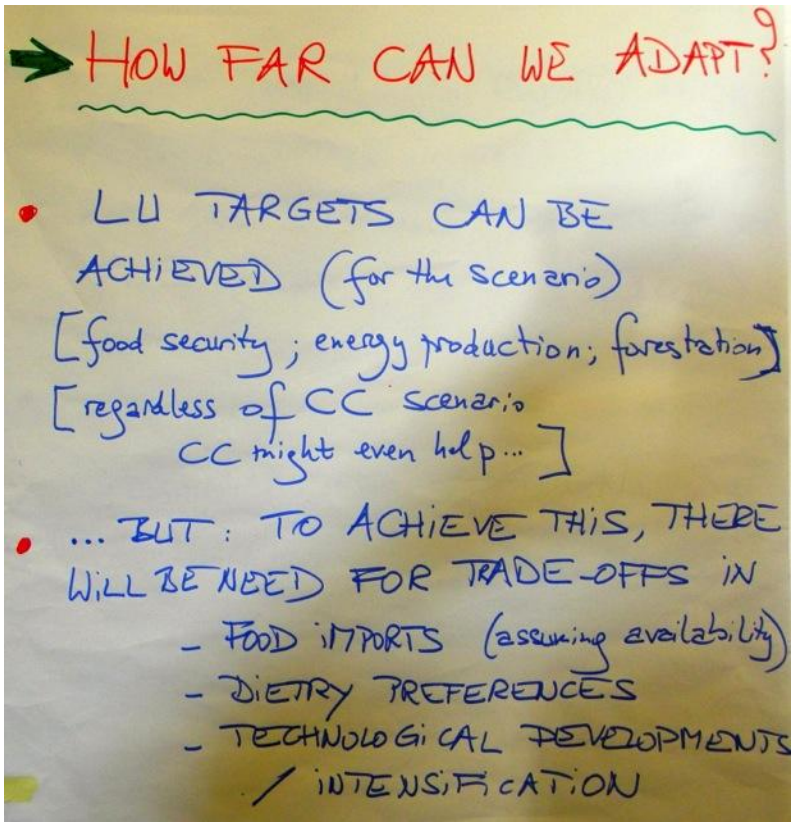
3.6.3. Mactopia selected adaptation options



In Mactopia the assumption is that there will be a 58% increase of population. This means that rural villages will become rural towns, but extreme urban expansion should be avoided. To adapt to this new situation and still maintain the current level of biodiversity, energy and food we need to do the following:

- Food imports increase by somewhere between 10 and 30%.
- Meat consumption decreases by 10 to 20% so that forest can replace some of the current life-stock areas.
- Technological innovation is high so there is a rapid increase of yield.
- All capitals are high. There cannot be a 'the winner takes it all'-mentality, but rather people share.

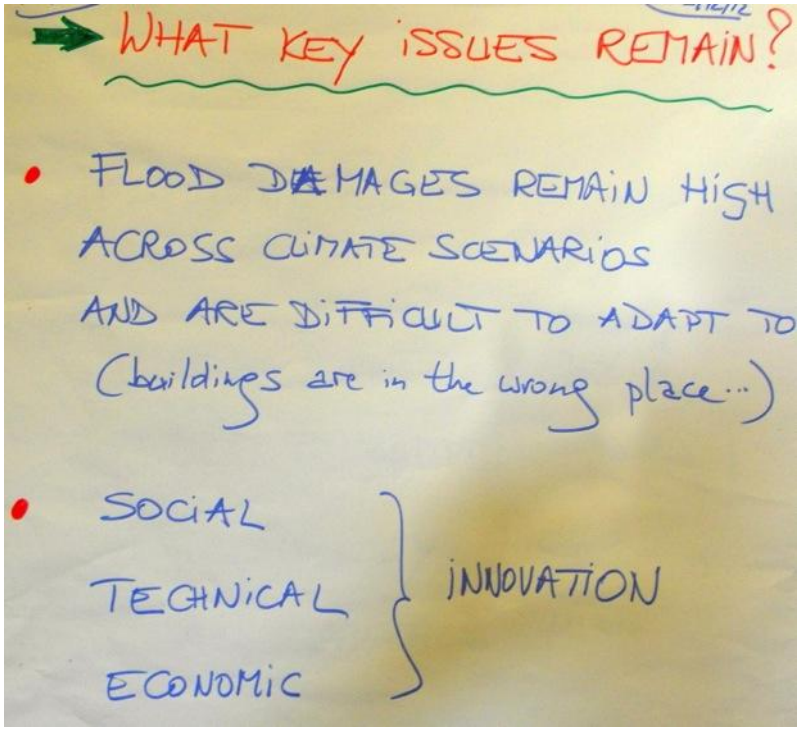
3.6.4. Mactopia scope of adaptation



Groups discussed the potential for adaptation to climate change in this scenario. They decided on the following:

- The key strength in Mactopia is resilience. Even when we stress the system because of climate change, we can still achieve all our targets because of the skills and capacity of our population. This resilience is based on innovation and technology.
- But we have to make adjustments and will need to make trade-offs. For examples if we change our diets, land becomes available and can be used for other things, like trees.
- The only thing we cannot do much about is flooding. There is hardly any difference in the amount of people affected by flooding, whether we are in a cold/wet scenario or in a hot/dry scenario. It seems that whatever the climate scenario no flood defenses can cope with people living in the wrong place. Therefore moving people/villages/cities might be a valid and necessary adaptation measure.

3.6.5. Mactopia remaining key issues



The groups decided that for the Mactopia scenario, there were a number of key issues remaining after possible adaptation options:

- Flood damages remain high and it seems very difficult to adapt to this. Therefore we believe it is more a matter of buildings being in the wrong place. The sea level rise seems always to be an issue, even if it is only a low / small rise.
- Social, technical and economic innovation remain key issues. If we do not have these, we cannot adapt. In Mactopia we do have them, but this is a reminder that these are the areas we have to focus on.

3.7. Comments and conclusions

3.7.1 Main strategy lines

- Well-being and equity of society seem to be more important than scarcity of resources.
- It seems that when there is a surplus of resources, it is key to maximise what is there. On the other hand, in the scenarios where there is a deficit, we need to play the card of innovation.
- In Mactopia we are dealing more with a general adaptation and resilience rather than specific climate change adaptation. The most important thing is to build social innovation and human capital, while climate change seems to be of secondary importance.

3.7.2 How far can we adapt

- There is a clear correlation between social cohesion and the extent to which you can adapt.
- It is surprising that a change in dietary preference is so significant and has such an implication on land use, especially in a self-sufficiency scenario for Scotland.
- Because of climate change there is actually an increase of productivity in Scotland. We have to make the choice whether we want to use this increase to make ourselves more resilient, or whether we use it to export to the rest of the world and increase the wealth of multinationals.
- Specifically in Scotland, the preference for whisky has a big influence on land use, with most import of wheat and barley going there.
- In a resource rich community it is difficult to change people's diet through any other way than pricing. But in Mactopia, for example, you have to change your diet significantly if you don't want to be dependent on imports and meet your other sustainability goals relating to, for example, energy production. Therefore interesting trade-offs have to be made.

3.7.3 Remaining key issues

- It seems that resource scarcity is a far less influential axis than wellbeing and lifestyle. Mactopia and The Scottish Play seem to be dealing with climate change issues, such as flooding, because they are equitable and have a certain amount of resilience. Whereas the two disparate scenarios (Mad Max and Tartan Spring) seem to be struggling with social problems in terms of adaptation and that become a much bigger issue for societies.

4. Robust adaptation options

The participants were asked to identify adaptation options that might work across all four scenarios. Then they returned to their scenario groups to test the robustness of these candidates by assessing whether they can be successful in their scenario. This then led to the identification of a final list of robust adaptation options.

4.1. Candidates for robust options

The candidates for robust options were:

- Innovation.
- Flood management includes moving people, living with and making space for water and flood defences.
- Social cohesion, including if it is differentiated or stratified (e.g. “Haves” and “Have Nots” in Mad Max).
- Spatial planning to make the best use of land.
- Changes in dietary preferences or requirements.

4.2. Robust options: conclusions

4.2.1 Innovation

Robust option across the four scenarios, however for different reasons and in Mad Max only for the “Haves”:

- Tartan Spring: The strategy is to export as much as possible, because export generates money. This money can be invested in innovation, which allows them to export even more.
- Mad Max: Innovation is mainly linked to agriculture. The innovation of the “Haves” is also linked to export. The “Have-nots” on the other hand cannot innovate.
- The Scottish Play: Innovation is not primarily technological, but also social and linked to policy. Innovation is appropriate, cheap and relates to brainpower rather than finances.
- Mactopia: Innovation is a key strategy for this scenario. There is a shift towards green energy and green technology and,, therefore, new infrastructure has to be built. That is not a problem, because there is money for it and the new infrastructure can

immediately be constructed in less vulnerable places. Innovation also situates itself in social cohesion (universal broadband) and governance and in maximising the benefits from water surpluses.

4.2.2 Flood management

It is important, but each scenario needs another approach:

- Tartan Spring: Here flood protection and flood resilience measures need to be combined in order to protect the business of the wealthy. An unintended consequence is that also the poor can benefit from these measures (e.g. warning systems).
- Mad Max: Flood defences are needed to protect high-value crops and resources rather than being concerned about the people living outside the "Haves" fenced communities. The choice has to be made whether to invest the money from export profits in flood defences or to let the land flood and create for example salt marshes or water reservoirs.
- The Scottish Play: There is no real dedicated water management plan, but it is part of the multifunctional land use strategy. Lots of things happen that should manage floods, but there is no one-fits-all strategy for the whole of Scotland. Flooding is also not necessarily seen as a problem, but can be an opportunity. The flooded land can be used for recreation or fish farms. A prerequisite, however, is to have a very mobile society and a flexible attitude towards water.
- Mactopia: People will have to move to make space for the water and new infrastructure will be built in less vulnerable spots. The adaptation of old infrastructure can be an incremental process, with the priority being the most vulnerable buildings or locations. Important is the emphasis on personal liability and this counts for all layers of society (local government and planners up to the level of legislation).

4.2.3 Social cohesion

Essential feature of The Scottish Play and Mactopia, but not really a strategy in Tartan Spring and Mad Max, as you need equity for this. Therefore social cohesion is not a robust option:

- Tartan Spring: Social cohesion is emerging rather than an option to work towards. It is a way of self-help for the rich and poor separately.
- Mad Max: Also it is no real priority or strategy, but rather something that happens / emerges. Furthermore it is also very differentiated and people are not working together across the whole society. The "Haves" want social cohesion insofar that it is economically beneficial to them.
- The Scottish Play: Social cohesion is a core part of the scenario logic. In a sense The Scottish Play equals social cohesion.
- Mactopia: Here also social cohesion is an essential feature of the scenario.

4.2.4 Best use of land

Robust as it is important in all. However, the reasons why and the measures to take are different:

- Tartan Spring + Mad Max: Land use is driven by the people who own it and is not a real strategy. For the "Haves" the measure of success is profitability, for the "Have-nots" it is survival.
- The Scottish Play: Land use is key, but there is no real strategy. People who own the land are supposed to use it well (usufruct). To make sure that owners manage the land in a way that is equitable for society, the idea of stewardship is developed. If you do not use the land well, you forego the right to own it.
- Mactopia: Mactopia tries to balance the needs for energy, food and forests through multifunctional land use and innovation. Strong regulations and personal liability are essential.

4.2.5 Dietary preferences

Not robust:

- Tartan Spring: For the poor it is a requirement rather than a preference and for the rich it is not an issue.
- Mad Max: It is an option, but the Scottish population does not benefit from it. The "Haves" would only decrease meat consumption to increase meat export and the "Have-nots" just eat what they can, whether that is fish or poultry or deer.
- The Scottish Play: It is a key part of the scenario.
- Mactopia: It is part of the scenario, but it is only useful as an adaptation option if it is in a mix with other options.

4.2.6 Conclusion

Innovation, flood management and best use of land can be considered robust options across the four scenarios. However, they are still very context-dependent.

5. Meeting Europe, meeting Scotland

On the afternoon of day two, one regional scenario group was teamed up with one European scenario group to explore each other's scenario. The project team prepared a comparative analysis with the following results.

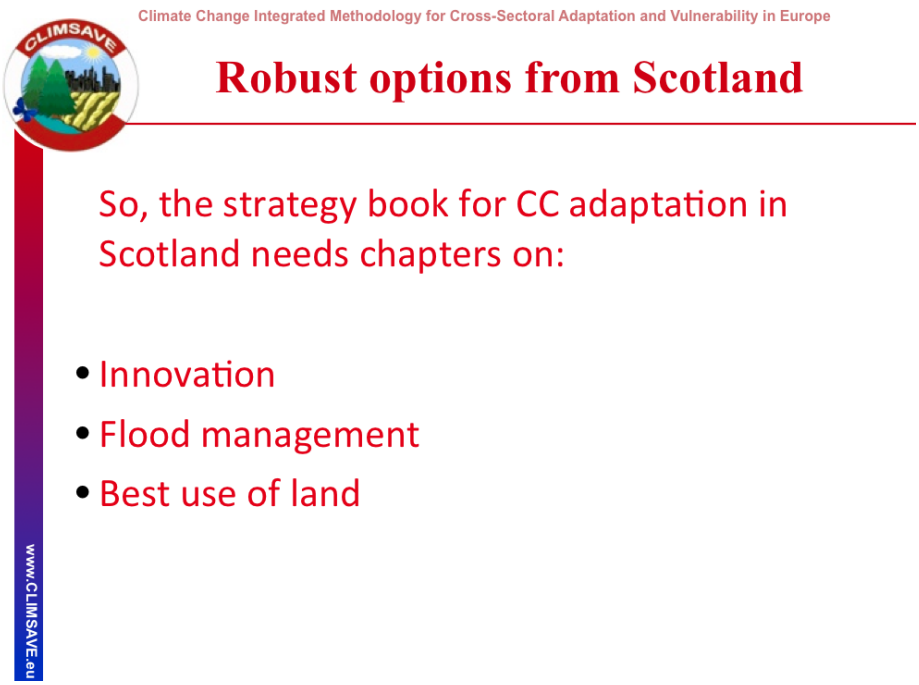
5.1 Robust options

5.1.1 Europe

Comments and clarifications from the participants:

- For a scenario such as 'Should I Stay or Should I Go' the only way to survive is to build local communities as early on in the scenario as possible.
- Architecture is understood as urban agriculture, green roofs and greening cities in general.

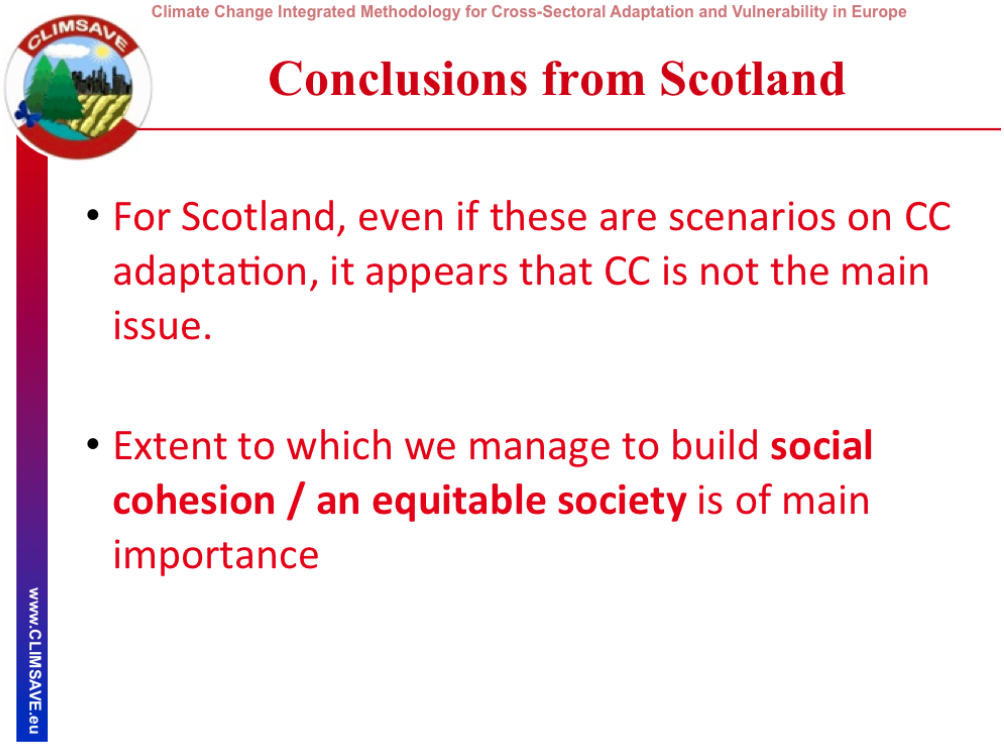
5.1.2 Scotland



Comments and clarifications from the participants:

- Flood Management did not work in Europe – maybe because it needs a more regional / unified approach. However, it has to be said that pure flood protection also did not work in Scotland. Flood management includes flood defences, but also moving people and businesses from vulnerable areas for example.

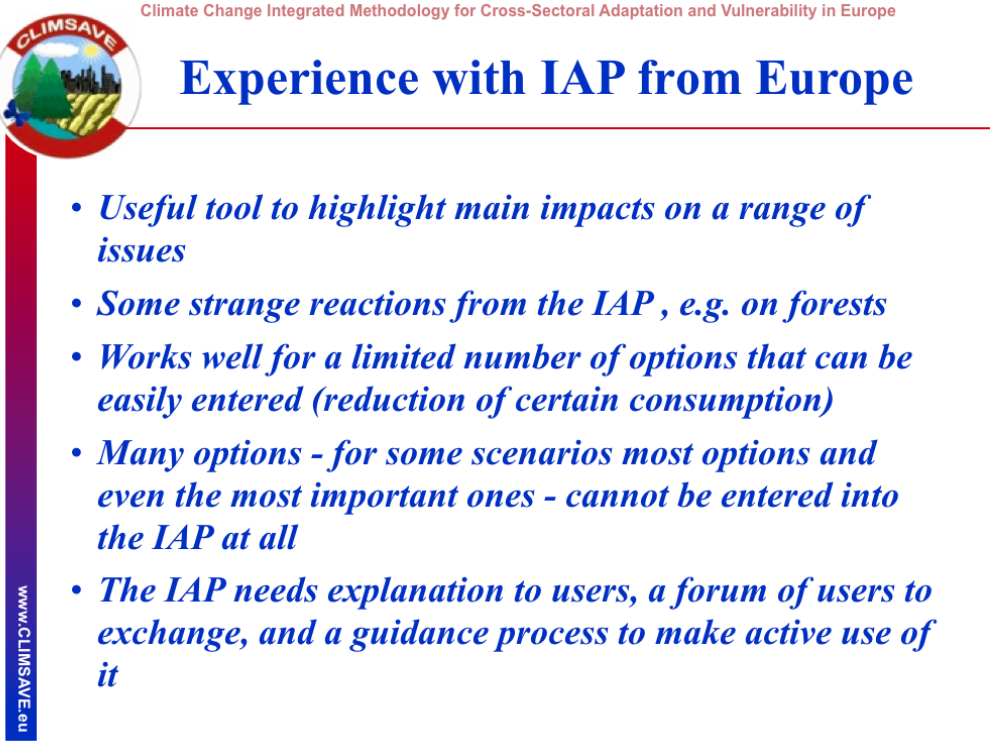
5.2 Conclusions

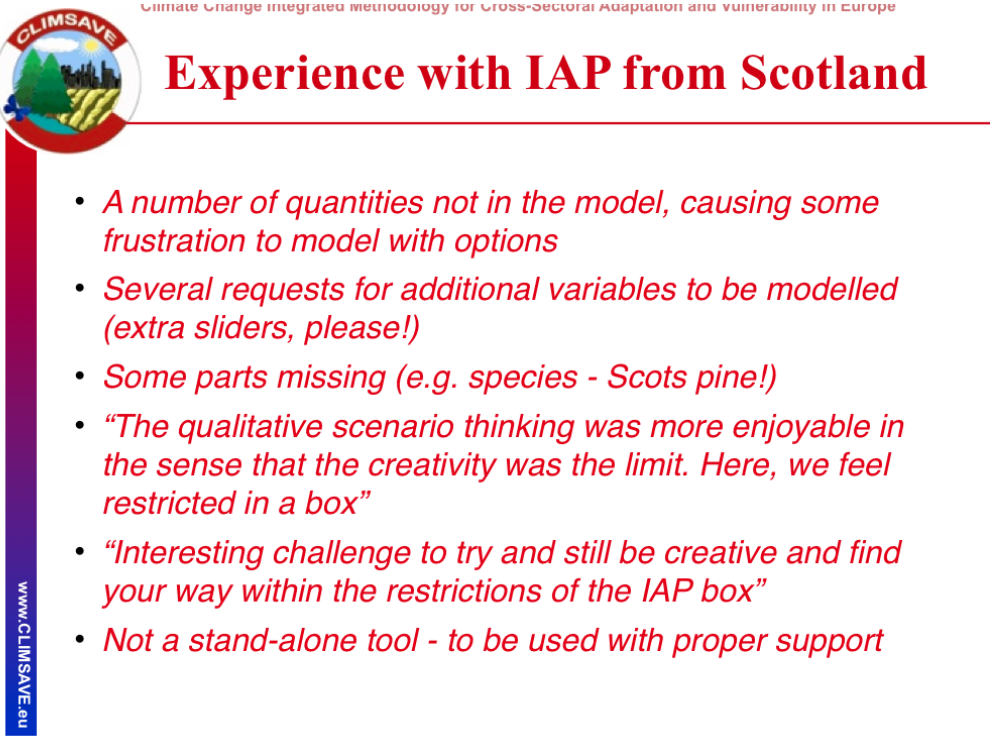


Comments and clarifications from the participants:

- In Europe a change in people's mind-set is important. They have to deal with having less, simply because there is less.
- In Scotland climate change sometimes even provides opportunities, but not in the case of extreme events. Furthermore, it is unclear what happens to the supply chain.
- For Scotland, it is important to realise that economics alone will not save us, because then we will end up in Mad Max. Also, governance is really important.

5.3 Experience with the IAP

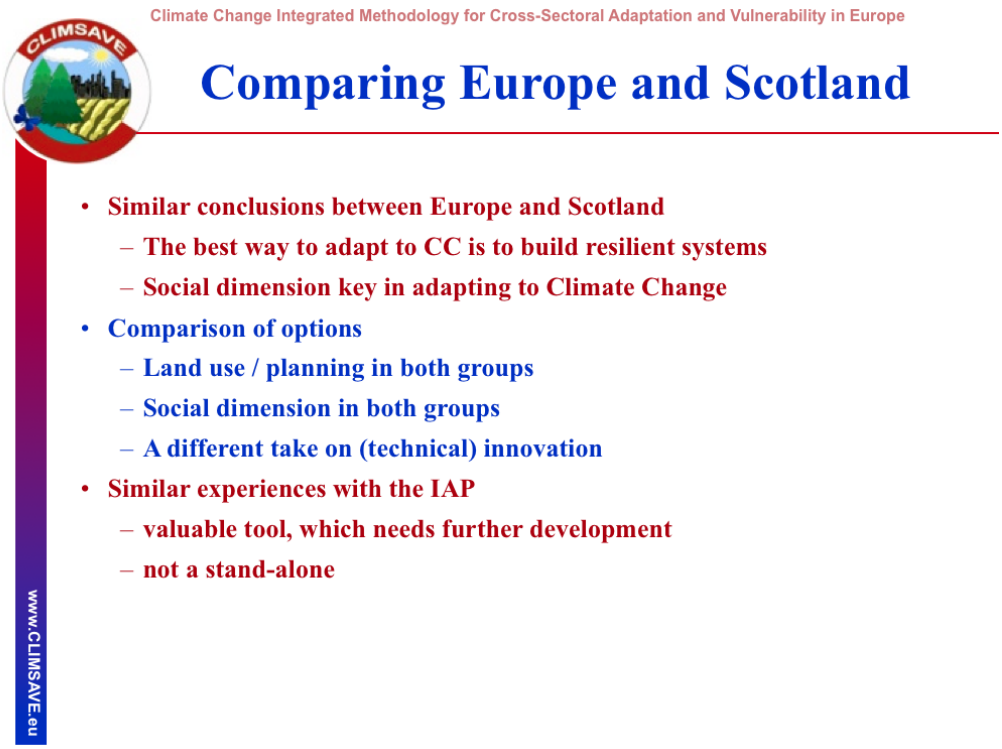




Comments and clarifications from the participants:

- The social, fuzzier side of things is a lot more difficult to quantify in the model, but that is inherent to this type of tool. For these 'soft' options you need to be innovative in how you translate them into the IAP.
- The IAP is a tool to stimulate discussion and debate and not to predict the truth. It allows you to explore whether your imagination and your qualitative ideas on climate change adaptation work out.
- It would be useful if the IAP would give users an explanation of why things happen.

5.4 A comparison of Europe and Scotland



6. Learning points from CLIMSAVE

The participants from the European and regional level discussed together in small groups how they experienced the CLIMSAVE process and what applications they see for the process and results. The comments from the subsequent plenary session were as follows:

A. How was the CLIMSAVE experience for you?

- It was a very positive experience. I have met a lot of people and hope to stay in touch with them.
- It was interesting to see the importance of social adaptation. Unexpectedly it turned out to be a key issue.
- Sustainable procurement is important.
- Acknowledgement of our hard work.

- Very helpful and enlightening.
- Good facilitation.
- I felt sometimes that the groups were too small. And that there was a lack of experience or different experiences in the groups. That was not always good for discussion.
- The small groups cause too much of an individual influence.
- The integrated approach is interesting, but it would also be nice to go in depth and to find out which factors really affect the model.

B. <u>How should the CLIMSAVE material be used from here onwards?</u>

- I would like to present the project to my colleagues. Therefore a short presentation on CLIMSAVE and its results (quantitative, qualitative and how they were developed) would be useful.
- You should find ways to use the tool in the context of policy-making. I see the IAP as a tool for informed discussion, so you should not overdo it or worry too much about the results. They are mainly helpful to aid the discussion.
- I want to see the tool being more refined. That would make it more useful.
- In a Scottish context the IAP resolution is too coarse, since decision-making will be done at a regional level. The resolution needs to be finer, the climate data need to be more refined. The tool can be used practically within the National Planning Framework or Scottish Land Use Strategy, but then refinement is needed.
- Seek endorsement from the EEA. Make the UN-level and Commission more aware.
- Maybe within Horizon 2020, there would be a chance to explore the different sectors more specifically.
- A basic presentation set on CLIMSAVE would be helpful so as to present it to local NGOs.
- The IAP can serve as a basis for a larger discussion, but we really need a presentation so we can share the project.
- The tool would be very useful for Environmental Assessment Plans. It would help discussion on strategic planning and can get people involved.
- It can aid discussion by specialists on the different subsectors (e.g. agriculture or water management), but then possibilities to alter the system are necessary so that specialists can play with it.
- The IAP could be a valuable educational tool and you can give demos. It is very visual, so you can show people what happens.
- I really like the scenario development as such. We had really inspiring discussions and this is certainly something I can use in my job.
- IAP might be a good tool to support discussion on climate change mitigation and adaptation in the Covenant of Mayors in Malta.
- Maybe we can create a LinkedIn-group?

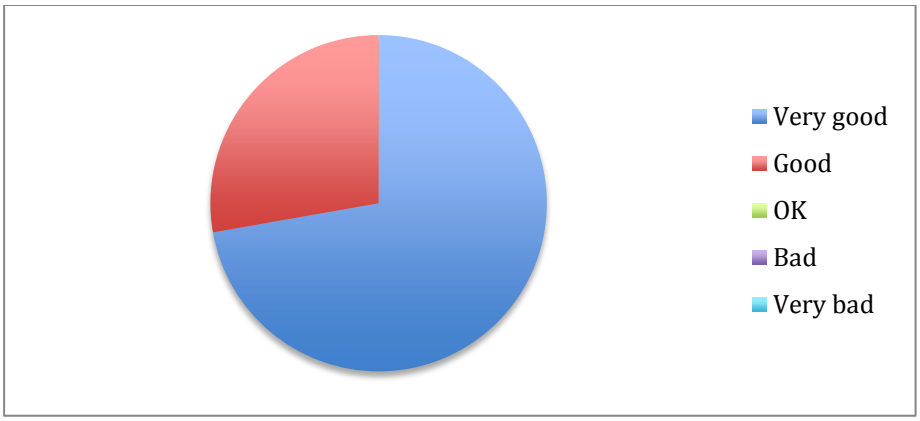
7. Written evaluation[2]

7.1 Feedback form: CLIMSAVE - 3rd Stakeholder Workshop

1. How do you rate the workshop in general?

Please mark:

13 Very good ***5*** Good ☐ OK ☐ Bad ☐ Very bad



Comments - Please write:

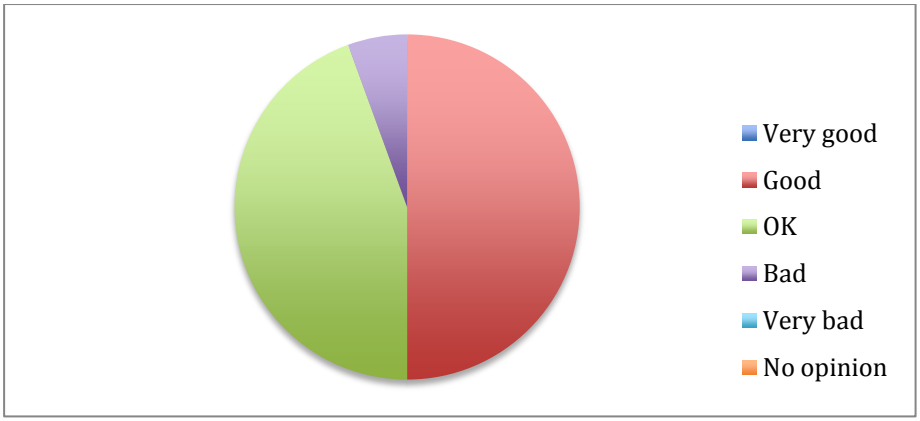
- 'Professionally facilitated to make sure it moved forward.'
- 'Very organised.'
- 'Less engaging than the scenario building workshop but provided some unexpected "learning".'
- 'Probably be more broad range of opinions when larger breakout groups? Danger of one person taking over.'
- 'The workshop was interesting, challenging and informative.'
- 'Well organised.'
- 'Interesting, well structured.'

2. Are you satisfied with the IAP?

Please mark:

☐ Very good ***9*** Good ***8*** OK ***1*** Bad ☐ Very bad ☐ No opinion

[2] The data shown below are the accumulated results from the feedback forms distributed to the European and the regional (Scottish) stakeholders.



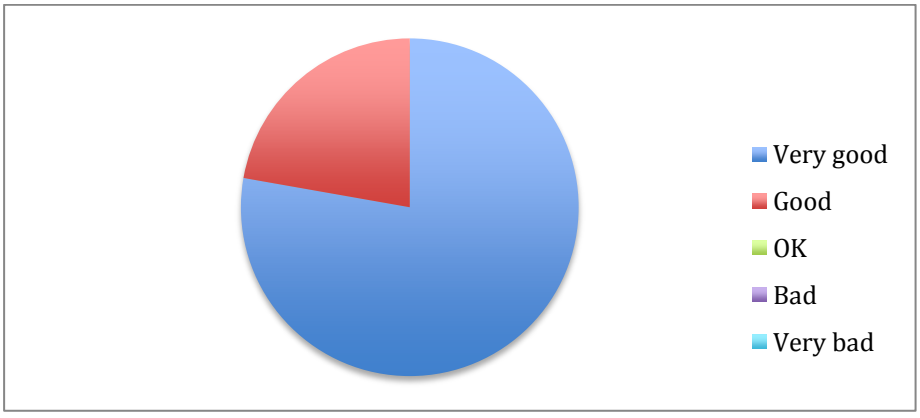
Comments - Please write:

- 'Difficulties with soft options have been well-discussed, but the scope of potential outcomes is still impressive.'
- 'Need more indicators / sliders.'
- 'Good as a heuristic tool.'
- 'A very good start at a very complex modelling problem. Am keen to see it used and refined in the future, applied to a range of scenarios.'
- 'Some technical options and limited adaptation options.'
- 'Absolutely sufficient for a good discussion.'
- 'As still in development, difficult to say. However, has potential be extremely useful as a tool to aid discussion and develop scenarios.'
- 'Explanation needs to be clearer + operationalisation with socio-economic factors.'
- 'Model has its constraints which have to be addressed, but okay for now.'
- 'We did not have a chance to compare different options.'
- 'Still under development, but has great potential.'

3. How do you rate the work of the facilitators?

Please mark:

14 Very good ***4*** Good ☐ OK ☐ Bad ☐ Very bad



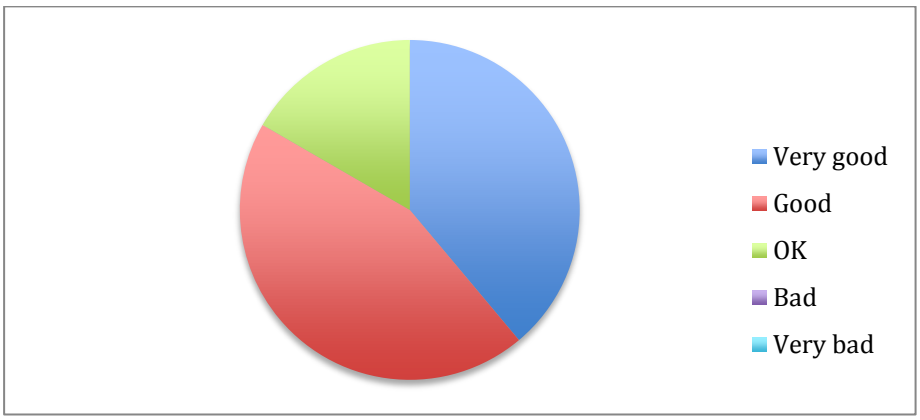
Comments - Please write:

- ‘Very organised.’
- ‘Clear and helpful for most sessions. Clarity about desired outcomes lacking in a couple of sessions.’
- ‘Be careful to make sure everyone is contributing and not give too much weight to one person’s opinions.’
- ‘Our facilitator did not fully understand the subject, but it did not matter too much.’
- ‘Facilitators were excellent, well informed, helpful and most of all friendly. Greatly impressed by their ability to keep us on track.’
- ‘Sometimes questions were not consistent amongst groups, so there was confusion when presenting.’
- ‘Professionals.’
- ‘Very well organised, but third workshop not as slick as first and second.’

4. How do you rate the work of the content supporters / IAP experts?

Please mark:

7 Very good ***8*** Good ***3*** OK ☐ Bad ☐ Very bad



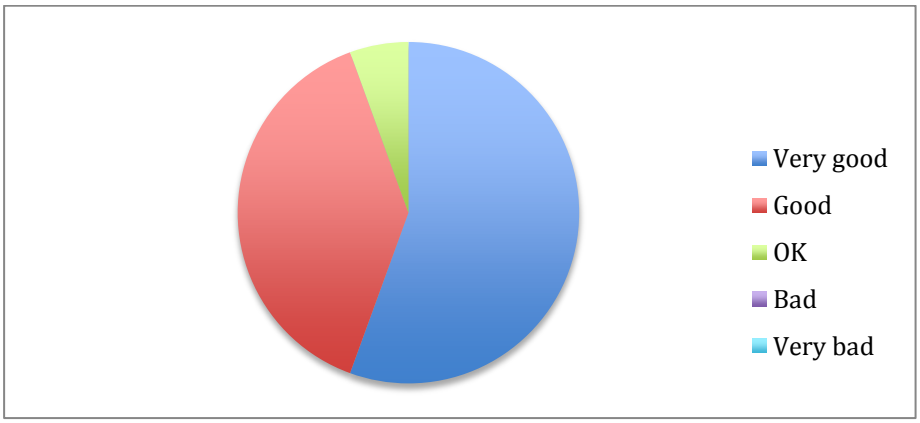
Comments - Please write:

- ‘Some more input into why particular model outcomes occur would have been useful.’
- ‘Very helpful.’
- ‘Helpful responses when required.’
- ‘Again excellent. Well informed (obviously), but made a complex subject understandable.’
- ‘Not always clear what the factors were that guide the model, also not offer explanation.’
- ‘They still have a lot of work to do.’
- ‘One of them was dismissive of our comments, but others were interested and interactive.’

5. How do you rate the practical arrangement (invitation, travel, venue, hotel, catering)?

Please mark:

10 Very good ***7*** Good ***1*** OK ☐ Bad ☐ Very bad



Comments - Please write:

- 'Dinner at Spoon wasn't great.'
- 'Cannot fault it.'
- 'No wifi at hotel.'
- 'Good organisation!'
- 'Excellent as always.'

6. Any further comments?

- 'Well done.'
- 'Have found the whole process very interesting and it was good to be able to share experience of process with the European group.'
- 'It has been a pleasure working with you - thank you.'

CLIMSAVE - Full workshop series

7. In how many CLIMSAVE Stakeholder Workshops have you participated?

Write number: 1 workshop: **7** 2 workshops: **5** 3 workshops: **6**

8a. In how far is the knowledge gained during the CLIMSAVE workshops relevant for your work?

8 Very much ***4*** Much ***6*** Somewhat ☐ Little ☐ Very little ☐ No opinion

8b. What were the three most useful things you learned?

Please write:

- 'Understanding complexity + 'Soft' items as social awareness are important in climate change adaptation'
- 'Good tips for visualisation of complex model results.'
- 'Consideration of social impacts + cross-cutting learning + contacts.'
- 'Scenario work was the most important part of the CLIMSAVE experience + important to go through a creative and structured process to develop ideas about future scenarios + there are common adaptation / resilience issues in Scotland and Europe'
- 'Consistent opinions on sustainable development + info on Scottish sectors + importance of social cohesion.'
- 'The complexity of the problem.'
- 'Scenario development + interaction between IAP and stakeholders + IAP development.'
- 'A pan-EU model could serve as a platform for planners + cross-relationships between risks + liked the EU-Scotland practical session.'
- 'Scenario development + unexpected interactions within scenario storylines - as decided by IAP + contacts with relevant people.'
- 'The importance of social capital + some options such as reduced meat consumption are effective mitigation AND adaptation strategies + natural flood defences alone can be effective.'
- 'Great way / inspiration of organising workshop + understand climate change impacts better + possibilities / limits of CLIMSAVE.'
- 'Importance of social capital + how relevant the robust options are already today + the big aid for reaching impact / connection the agricultural sector has on other sectors and systems.'
- 'The extent of the impact of reduced meat consumption + general acknowledgement of the crucial importance of social capital.'
- 'Importance of social capital in adaptation to climate change + the relative unimportance of (technological) innovation + that it is fun to do this kind of exercise.'
- 'Different ideas, views, different scenarios.'
- 'Better understanding of scenario development + new ideas on facilitation and stakeholder participation.'
- 'Social equity is most important adaptation tool + innovation is key to successful adaptation + providing similar conditions (economic, etc) Scotland's adaptation strategies could be compatible within Europe.'

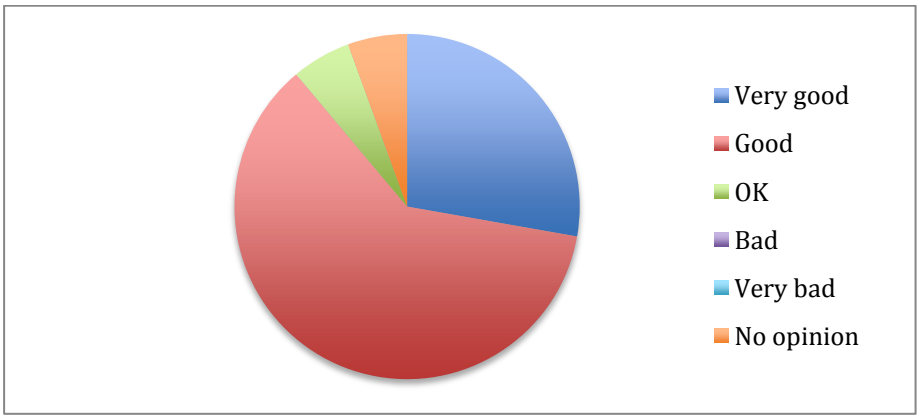
9. Did you make any new contacts during the CLIMSAVE workshops that are useful for your work?

16 Yes ***2*** No

10. How do you rate the finalised storylines?

Please mark:

5 Very good ***11*** Good ***1*** OK ☐ Bad ☐ Very bad ***1*** No opinion



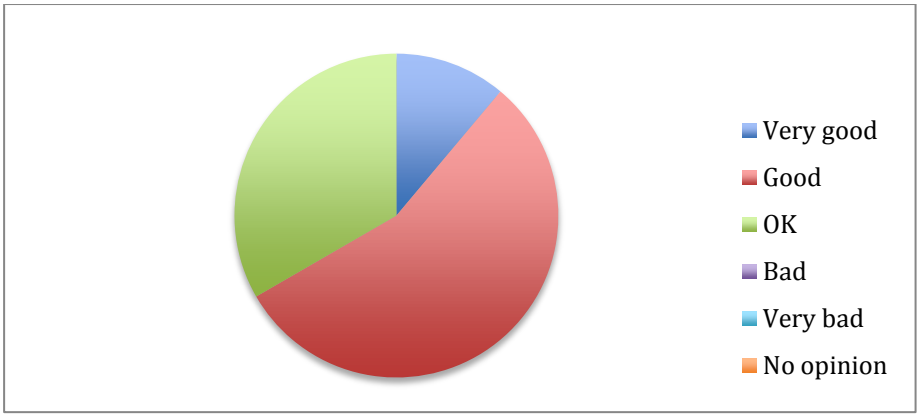
Comments - Please write:

- 'The scenarios sometimes felt a bit .... It would have been useful to interact with the people who had derived them.'
- 'Are they realistic?'
- 'Excellent fictions, practical use in context.'
- 'Useful "extreme" socio-economic pathways to distinguish social changes.'
- 'Lack of ownership as I did not contribute.'
- 'They are consistent, some aspects are plausible, most aspects hopefully never happen.'
- 'They might need some clean-up to get more internally consistent.'
- 'Conclusions are very interesting.'
- 'I think Mactopia had more detail in the post-its that we did not include in the narrative - hadn't realised ours was a bit light until reading the report from the 2nd workshop.'

11. How do you rate the set of adaptation options?

Please mark:

2 Very good ***10*** Good ***6*** OK ☐ Bad ☐ Very bad ☐ No opinion



Comments - Please write:

- 'Including additional options and interpreting existing options is desirable to refine the model.'
- 'I imagine they will look better once the project team has analysed them, less generic.'
- 'Not totally comprehensive.'
- 'I would have made social cohesion more explicit.'
- 'It can be difficult to incorporate them into the IAP.'
- 'Partly cannot be integrated in the model + not sure whether there was enough expertise in the small groups to come up with excellent solutions.'
- 'A bit vague and general, yet absolutely relevant.'
- 'Could be more specific - many policy-makers may start asking "what exactly do you mean?"'
- 'In process, some valuable options fell off the cliff, hope this information is not lost.'
- 'Too soon to tell until tool is finished. Needs explanation bubbles as discussed in workshop.'

12. How much do you agree or disagree with the following statements regarding the whole CLIMSAVE scenario process?

	I disagree completely	**I disagree to some extent**	**I cannot say**	**I agree to some extent**	**I agree completely**
The scenario-building process as a whole is useful for climate change strategies	-	-	***1***	***4***	***13***
Participating in the workshops has helped me to build a more comprehensive understanding of climate change issues	-	-	***1***	***10***	***7***
Participating in the workshops has helped me to see climate change adaptation in a new way	-	***3***	***1***	***8***	***6***
Participating in the workshops has helped me in understanding the policy actions needed	-	-	***4***	***9***	***5***

The workshops have helped in finding novel linkages between factors affecting climate change adaptation	-	-	***1***	***12***	***5***
Thinking about the long-term has helped in assessing the problems faced by climate change adaptation in Europe in a meaningful way	-	-	***2***	***11***	***5***
Applying the IAP has helped me to evaluate the usefulness of adaptation options	-	***1***	***5***	***10***	***2***
Thinking about climate change adaptation using four scenarios has increased the quality of the resulting options and strategies	-	-	-	***10***	***8***
The adaptation options and strategies developed are useful for the debate on climate change	-	-	***1***	***3***	***14***

13. Any further comments?

Please write:

- 'I am unsure this will be a tool used by Scottish Water because we probably want answers; but it is valuable for our input to be included in its development and I am sure that, as it is used by those working in research and policy, it will come back to us in terms of research areas we may be interested in seeing develop.'
- 'Good luck in the future.'
- 'Excellent organisation!'
- 'Excellent work and organisation.'
- 'Discussion groups were too small.'
- 'While useful, this process needs to be contrasted / compared with other analysis.'

8. Next steps

After this third and final workshop, the CLIMSAVE project foresees the following steps to finalise the project – as presented at the end of this workshop:

- Current plan (next steps) within CLIMSAVE: model development/refinement, uncertainty/sensitivity analysis, publications (journal special issues).
- Contributing to the European Commission's Climate Change Clearing House: Climate-Adapt is a portal for the exchange of information and CLIMSAVE is already embedded in the portal.
- Some CLIMSAVE partners are lead authors on the IPCC, which supports the international dissemination of the CLIMSAVE outcomes.
- European Climate Change Adaptation conference in Hamburg – CLIMSAVE is a co-organiser and has many presentations and a special science-practitioner session on the Scottish case study.
- Exploring potential funding opportunities with the EU for high-end scenarios.
- Exploring links with Scottish Environment Web (SEPA's online portal for environmental information).
- Exploring links with ClimateXChange, which is a climate change initiative in Scotland.
- Exploring various options with Adaptation Scotland, e.g. potential Parliament event, to which you would all be invited. Adaptation Scotland brings together stakeholders in Scotland to address and prepare for the impacts of climate change.
- Developing network of Scottish scenario developers (within an ecosystem service context) across a number of Scottish institutions.

ANNEX 1: Agenda

Monday, 3 December, 2012

09:30 Registration and welcome coffee

WELCOME & INTRODUCTION

10:30 Welcome - Prof.. Mark Rounsevell (University of Edinburgh)

Introduction to CLIMSAVE – Dr. Paula Harrison (University of Oxford)

Overview of the workshop – Dr. Marc Gramberger (Prospex)

INTERMEDIATE OUTCOMES

11:10 Analysis of intermediate outcomes of scenarios and options

12:30 Lunch

IMPROVING CLIMATE CHANGE ADAPTATION STRATEGIES PER SCENARIO

13:30 Introduction to the Integrated Assessment Platform

14:00 Presentation of climate change adaptation plans per scenario

14:45 Improving strategies – round 1

15:30 Coffee / Tea

16:10 Review of options

16:25 Improving strategies – round 2

17:15 Conclusions

18:00 Wrap-up

18:15 End of day's work

Whisky tasting and dinner

Tuesday, 4 December, 2012

09:00 Overview of the day

CLIMATE CHANGE ADAPTATION ACROSS SCENARIOS

09:10 Presentation of results day 1

10:30 Identification of candidates for robust options

10:45 Break

11:00 Addressing robust options

13:00 Lunch

LEARNING FROM CLIMSAVE

14:00 Climate change adaptation: Meeting Scotland, meeting Europe

15:30 Comparative analysis for Scotland and Europe

16:15 Break

16:30 Learning points and follow-ups for CLIMSAVE

17:20 Conclusions

WRAP-UP AND CLOSURE

17:50 Wrap-up and evaluation

18:00 End of workshop

Reception

20:00 Dinner

ANNEX 2: List of participants

Participants regional workshop:

Baarda	Phil	Scottish Natural Heritage (SNH)
Brown	Iain	The James Hutton Institute
Christie	Mary	Scottish Natural Heritage (SNH)
Cook	Graeme	The Scottish Parliament Information Centre
Densham	Jim	Royal Society for the Protection of Birds (RSPB)
Dittrich	Ruth	Scottish Agricultural College (SAC)
Dlugolecki	Andrew	Andlug Consulting
Edmond	Graham	Transport Scotland
Esson	Graham	Perth and Kinross Council
Harding	Andrew	CXC
Jacques-Turner	Miranda	Scottish Water
Kerr	Andy	Edinburgh Centre for Climate Change
Kosciewicz-Fleming	Linda	The Scottish Government
Ormiston	David	North Lanarkshire Council
Smith	Mike	Forest Research
Street	Roger	UK Climate Impacts Programme (UKCIP)
Wolstenholme	Ruth	SNIFFER

Observer:

Machen	Ruth	Durham University

CLIMSAVE team:

Scientific advisors included: Eric Audsley – Cranfield University; Lenka Bartosova – Mendel University Brno; George Cojocaru – TIAMASG Foundation; Robert Dunford – University of Oxford; Martina Flörke – CESR University of Kassel; Paula Harrison – University of Oxford; Chris High – Open University; Ian Holman – Cranfield University; Abiy Kebede – University of Southampton; Kasper Kok – Wageningen University; Jill Jäger – SERI; Marc Metzger – University of Edinburgh; James Paterson – University of Edinburgh; Mark Rounsevell – University of Edinburgh; Florian Sallaba – Lund University; Anabel Sanchez – Centro de Investigación y Aplicaciones Forestales; Benjamin Stuch – CESR University of Kassel and Florian Wimmer – CESR University of Kassel.

The workshop process was professionally designed, prepared, facilitated and reported on by Prospex bvba. Team members from Prospex included Jill Adams, Marc Gramberger, Steven Libbrecht, Marjan Maes, Heidi Mestdagh, Peter Rakers, Peter Vandevyvere and Martin Watson.

ANNEX 3: List of adaptation options per scenario[3]

Tartan Spring

Category of adaptation option	Adaptation options (42 + 5)
NATURAL CAPITAL	9 + 2
1. Agriculture	*Yield improvement due to plant breeding and agronomy* Public-private initiatives in agriculture New crops + livestock better suited to climate Agricultural improvement through non-fossil fuel means Community allotments
2. Biodiversity	
3. Natural resource management	*Lower intensity forest management* Water resources management: dams, pipelines, etc. Max newly available land Settlements away from low-lying coastal zones Avoiding building on floodplains Green infrastructure: trees, etc.
FINANCIAL CAPITAL	9 + 0
4. Insurance	Insurance Weather derivatives
5. Financial support / incentives	Private sector provides - public sector pays Hydro public-private partnership: water storage + electricity Private-public partnership Defense barriers to max profit Flood defense scheme that make profits Incentives
6. Taxes	Viable carbon accounting system
MANUFACTURED CAPITAL	13 + 3
7. Green infrastructure	All houses to have rainwater harvesting meters by legislation Buildings adapted to extreme weather Housing fit for purpose: not overheat in summer, etc.
8. Energy	Energy grids patchy Reinforce electricity grid Electricity storage capacity Energy conservation - localised production Community energy schemes Small-scale renewables

[3] These lists contain the adaptation options per scenario, meaning the 16 options that are included in the IAP and the options developed during workshop 2. The numbers (e.g. 10+5) indicate the number of options generated by the stakeholders (e.g. 10) and the number of options that are present in the IAP (e.g. 5).

Category of adaptation option	Adaptation options (42 + 5)
9. Infrastructure / Technology	*Reduce water demand by using technology* *Improve flood defences by upgrading the standard* *Take measures to diminish flood damages* Trans-shipment points for water exports Alter harbours to accommodate sea level rise Cooling for machinery Reduce transport need through IT resilient to weather
HUMAN CAPITAL	2 + 0
10. Expertise	Increasing skills
11. Awareness	Awareness raising of CC issues and consequences
SOCIAL CAPITAL	4 + 0
12. Social networks	Micro-adaptation options towards 2050 - volunteers Reactive and patchy reaction to CC
13. Socio-technology	Innovative technology + human systems Reduce - reuse - recycle
CROSS-CUTTING	5 + 0
14. Governance / regulations	Governance set at the appropriate level Regulation Adaptation-poor due to short-term political instability Private micro adaptation + consultancy
15. Emergency response	Flood defense scheme that make profits
16. International cooperation	

Mad Max

Category of adaptation option	Adaptation options (35 + 5)
NATURAL CAPITAL	18 + 1
1. Agriculture	*Yield improvement due to plant breeding and agronomy* Allotments in urban areas Community woodlands Minimum sized areas for food protection (allotments) More crofting Sheep farming, hunting, and gathering Low input, sustainable agriculture, permaculture Technologies, GMO, transport Clonal forestry GMO for crops/biofuels New crop types Cultivation of marginal land with lots of fertilizers Irrigation Production efforts go up
2. Biodiversity	
3. Natural resource management	Water management: reservoirs, etc. Rainwater harvesting Efficiencies in resource management to max profit Basic environmental safeguards for big businesses Conservation of some SPP for 'sport'

Category of adaptation option	Adaptation options (35 + 5)
FINANCIAL CAPITAL	1 + 0
4. Insurance	Insurance
FINANCIAL CAPITAL	1 + 0
5. Financial support / incentives	
6. Taxes	
MANUFACTURED CAPITAL	7 + 2
7. Green infrastructure	
8. Energy	Development of local energy by have-nots Cooperative local energy production by have-nots
9. Infrastructure / Technology	*Improve flood defences by upgrading the standard* *Improve irrigation efficiency* Short lifespan materials Structural defense for critical infrastructure Composting toilets Wooden construction goes up Remove gully pots for health reasons
HUMAN CAPITAL	1 + 0
10. Expertise	
11. Awareness	Less meat consumption
SOCIAL CAPITAL	4 + 0
12. Social networks	Haves: building adaptive capacity: leadership, CSR Have-nots: using social capital, community-building
13. Socio-technology	Gated communities: self-sufficiency in water and energy Alternative industries (e.g. fishing)
CROSS-CUTTING	4 + 2
14. Governance / regulations	*Spatial planning policies to control urban expansion* *Prioritise water demand* Prioritise primary education
15. Emergency response	Food storage Stockpiling of food and water as a buffer Large emergency response labour force to respond to extreme events
16. International cooperation	

The Scottish Play

Category of adaptation option	Adaptation options (73 + 10)
NATURAL CAPITAL	20 + 3
1. Agriculture	*Yield improvement due to plant breeding and agronomy* Consider new crops from the South Crop diversity for resilience Optimise agriculture according to changing patterns Agronomy: nutrient use efficiency, resilience, etc. Use of animal waste as fertiliser Introduce midge burgers
2. Biodiversity	
3. Natural resource management	*Lower intensity forest management* *Increase number of protected areas* Upstream planting to capture water Reconnect floodplains Transfer water from plentiful to scarce areas Multifunctional land-use strategy Buffer zones - coastal and riverine More efficient use of resources Resource-rationing Composting toilets Rainwater harvesting Harness/capture water when plentiful Promote reduced water use Irrigation, balanced against urban demand and tourism Catchments: natural flood mngt Increase mobile venison stock
FINANCIAL CAPITAL	1 + 0
4. Insurance	
5. Financial support / incentives	Cost of national service?
6. Taxes	
MANUFACTURED CAPITAL	16 + 3
7. Green infrastructure	Adapt urban fabric (building, infrastructure) Improve building ventilation, cooling standards Rammed earth or straw bale buildings Greening cities
8. Energy	Renewable energy Energy production from tides and wind Energy efficiency Smart grids Planned energy blackouts Midges for biofuel
9. Infrastructure / Technology	*Reduce water demand by using technology* *Improve irrigation efficiency* *Take measures to diminish flood damages* Use of wind in water-based transport Raised buildings Hospitals ventilation

Category of adaptation option	Adaptation options (73 + 10)
	Relocate capital city Managed retreat, buffer areas Lowering maintenance costs
HUMAN CAPITAL	6 + 1
10. Expertise	CC adaptation R and D
11. Awareness	*Reduce water use by promoting a behavioral change* Use larders, not fridges Raise risk acceptance levels Live upstairs Self-sufficiency Publish public sector recycling performance
SOCIAL CAPITAL	7 + 0
12. Social networks	Mass society participation Encourage more voluntary work Ability to mobilise Vulnerable to large-scale events - no coordination Clantons provide social support for affected families Support focuses on very young
13. Socio-technology	Reduce - reuse - recycle
CROSS-CUTTING	23 + 3
14. Governance / regulations	*Spatial planning policies to control urban expansion* *Discouraging coastal development to reduce exposure to flooding* *Prioritise water demand* Limiting transport of goods Preventative or responsive Spend more on preventative action Factor 4 framework Spend more on maintenance Adaptive economic mngt More investment in CC adaptation options Decentralise Develop CC adaptation governance Mainstreaming adaptation Optimise flexibility Aim for flexibility Increase resilience Land ownership Organisation of national service?
15. Emergency response	Improve flood mngt shoreline mngt, planning for change Make most of warning systems Flood warning system, training Governmental climate emergency service Social service provides repair services Early warning systems Cost of warning systems Telephone trees
16. International cooperation	

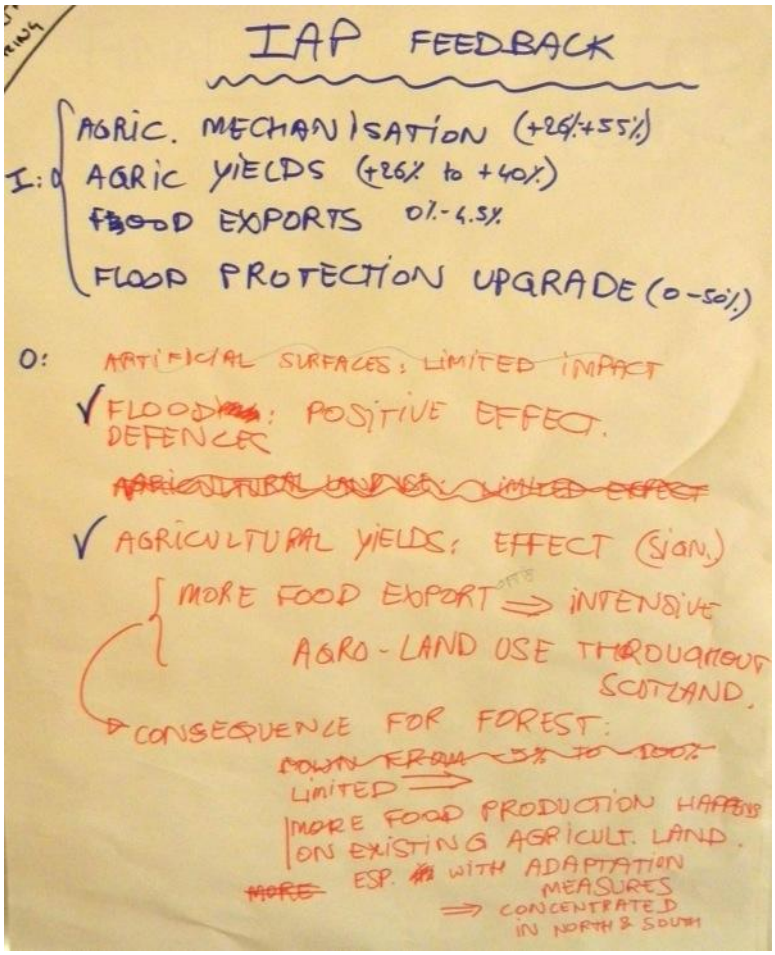
Mactopia

Category of adaptation option	Adaptation options (60 + 13)
NATURAL CAPITAL	12 + 5
1. Agriculture	*Yield improvement due to plant breeding and agronomy* Genetic technology for resilient varieties Agricultural methods adapted to CC Hard surfaces in gardens not allowed Crofting Manage land-use for high-grade agriculture Ban organic crops to reduce pathogens Cottage industry for creative adaptation
2. Biodiversity	Strengthening Scottish natural heritage
3. Natural resource management	*Wetland creation by moving flood defences inland* *Set-aside land* *Lower intensity forest management* *Increase number of protected areas* Development of new methods of coastal protection Sustainable catchment mngt Give up land to avoid flooding Increase density of settlements
FINANCIAL CAPITAL	4 + 0
4. Insurance	Insurance on CC risks for all sectors Compensation payment schemes
5. Financial support / incentives	Redistributing wealth to vulnerable households Sovereign Scotland fund
6. Taxes	
MANUFACTURED CAPITAL	29 + 4
7. Green infrastructure	More parklands, green belts Rainwater, greywater systems for buildings All buildings with appropriate onsite renewables Resilient building regulations Retrospective building regulations after flood/storm All houses with remote control systems Urban design planning for increased rainfall and resource efficiency Greening cities
8. Energy	Promote micro-hydro + tidal building resilience Reduce vulnerability of electricity networks to wind Coppicing for energy Fossil fuel free heat generation Fossil fuel free electricity generation Combined heat + power for waste disposal Smart grids
9. Infrastructure / Technology	*Reduce water demand by using technology* *Improve flood defences by upgrading the standard* *Improve irrigation efficiency* *Take measures to diminish flood damages* More remote working, use of IT

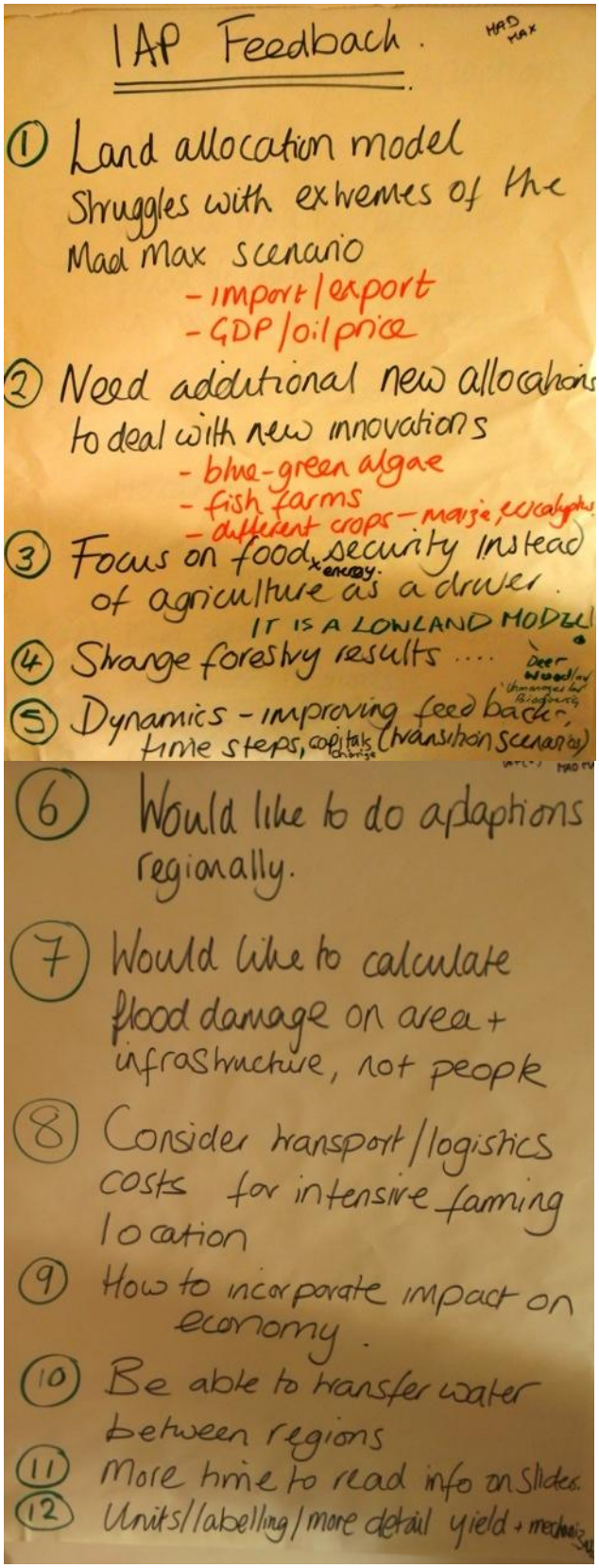
Category of adaptation option	Adaptation options (60 + 13)
	Flood defence walls increase size + height Develop water export facilities Promote micro-hydro + tidal building resilience Switch to waterless sewage system Coordinated transport modes to facilitate public transport More transport links Shared transport modes Free transport Enlarge and protect harbours Effective information systems to reduce transport Back-up systems for potential disruptions of IT systems Strong defense Infrastructure development is multi-sectoral - shared service
HUMAN CAPITAL	5 + 2
10. Expertise	Reorganisation of education systems for innovation and R&D Sharing community knowledge about resilience options Programs for outward looking cultural + creative development Twinning fro adaptation
11. Awareness	*Reduce water use by promoting a behavioral change* *Reduce meat consumption* Develop awareness campaign to involve all individuals
SOCIAL CAPITAL	3 + 0
12. Social networks	Bring back flags: flood liaison + advice groups Pressure from local communities on individuals not complying Support networks for adversity
13. Socio-technology	
CROSS-CUTTING	7 + 2
14. Governance / regulations	*Spatial planning policies to control urban expansion* *Discouraging coastal development to reduce exposure to flooding* Integrated policies Compulsory strong regulation on impact assessment Ministry for adaptation + agency Strong diplomacy capability Marketing Scotland as new summer vacation spot
15. Emergency response	
16. International cooperation	Advice + support services to other countries Exchange programs with other countries or cultures

ANNEX 4: Feedback on the IAP

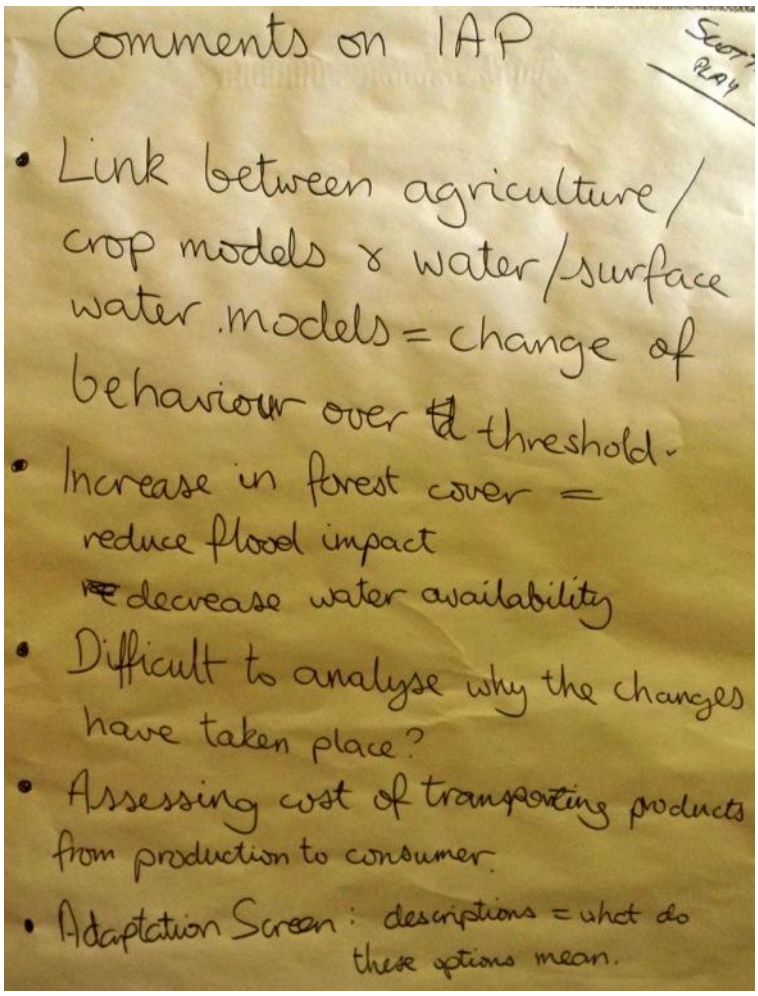
Original output Tartan Spring:



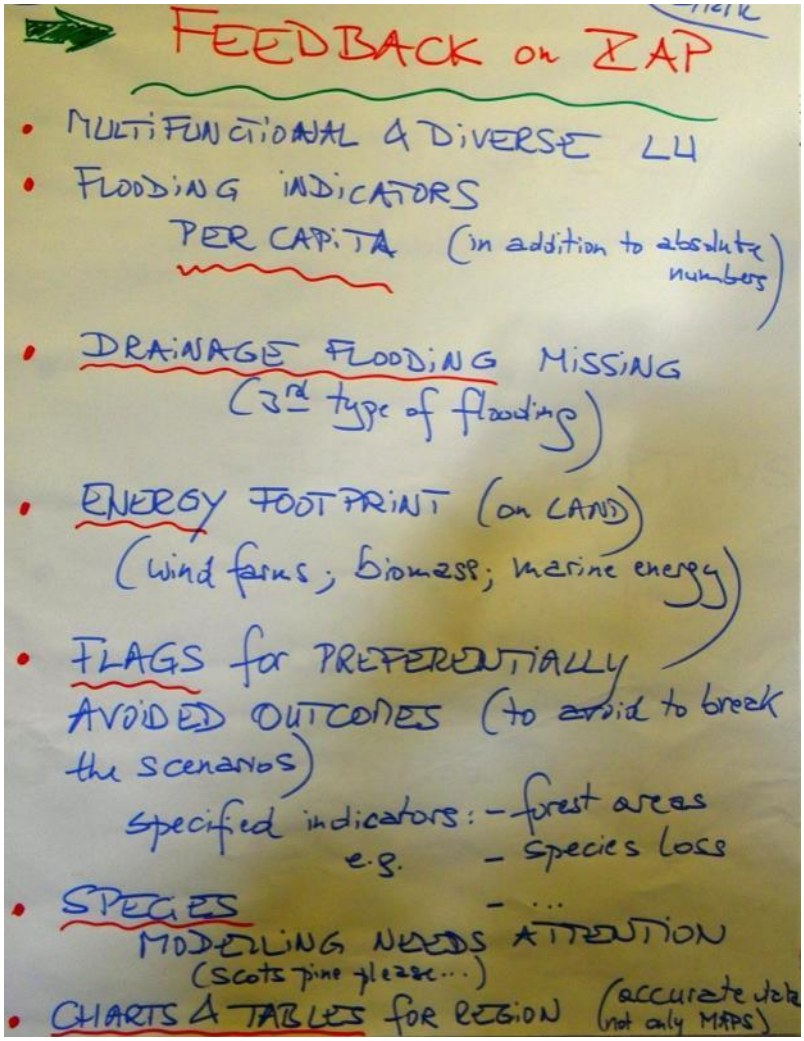
Original output Mad Max:



Original output The Scottish Play:

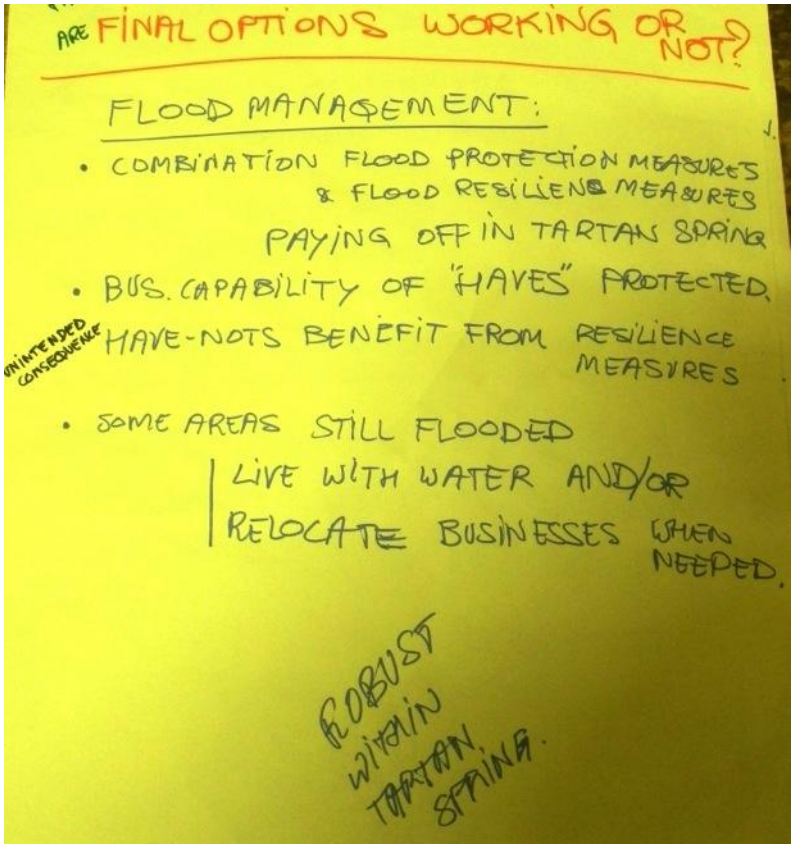


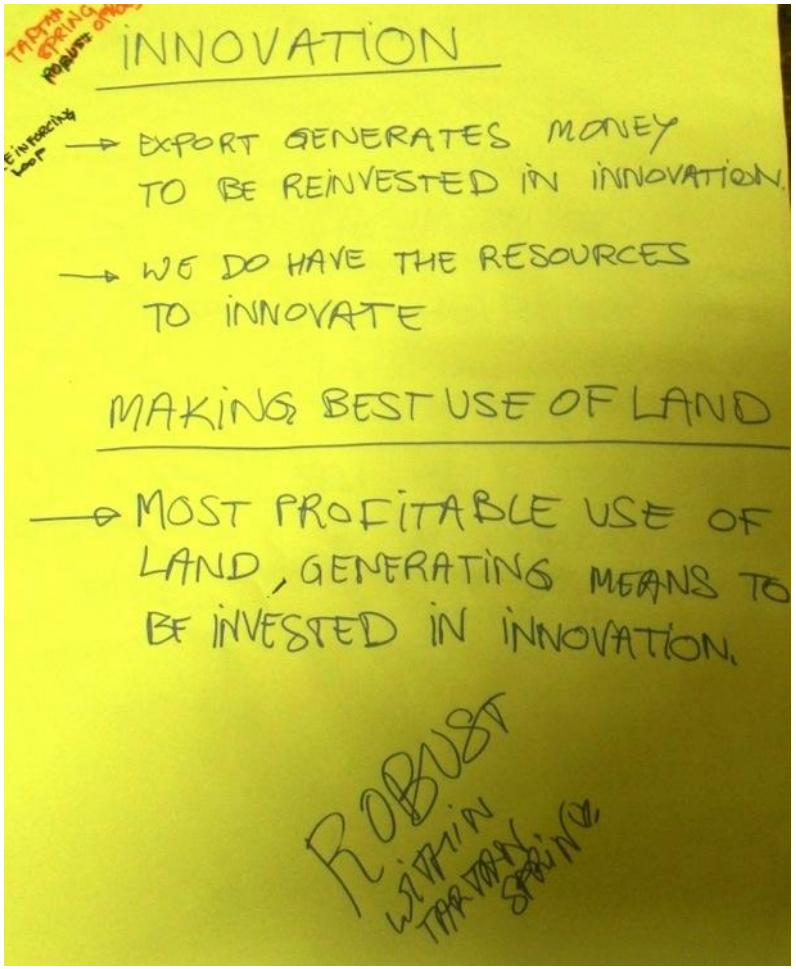
Original output Mactopia:

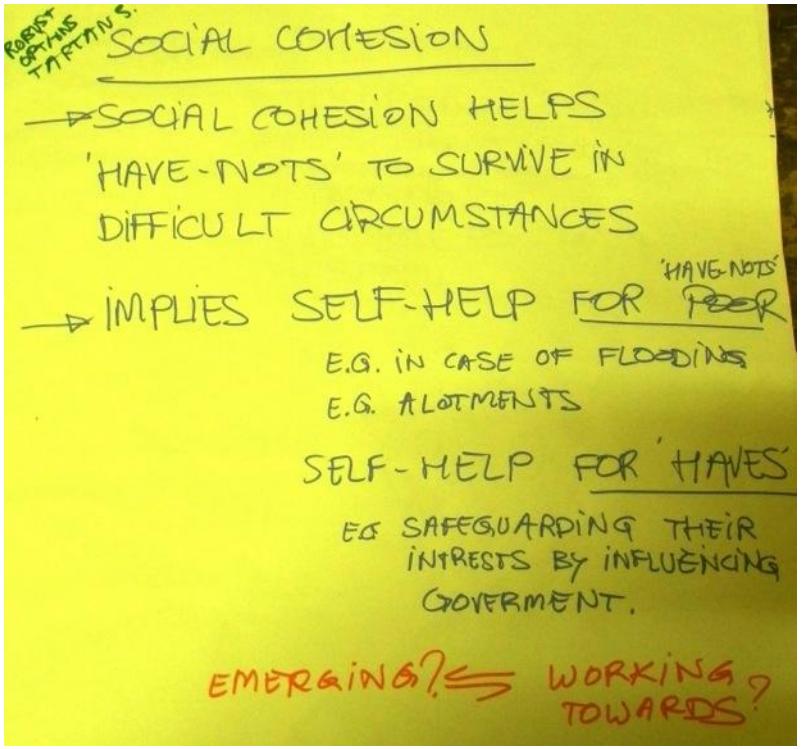


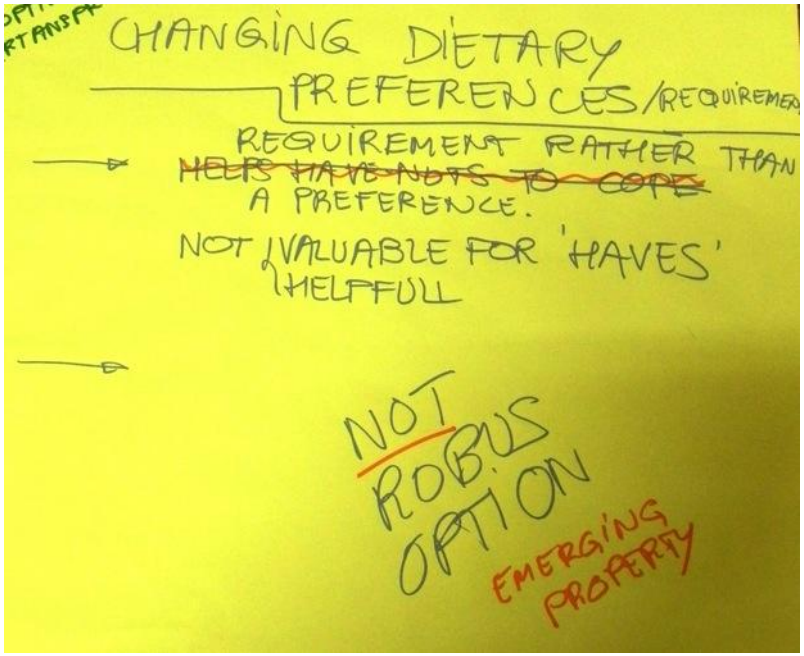
ANNEX 5: Testing candidates for robust adaptation options

Original output after testing candidates for robust options in Tartan Spring:

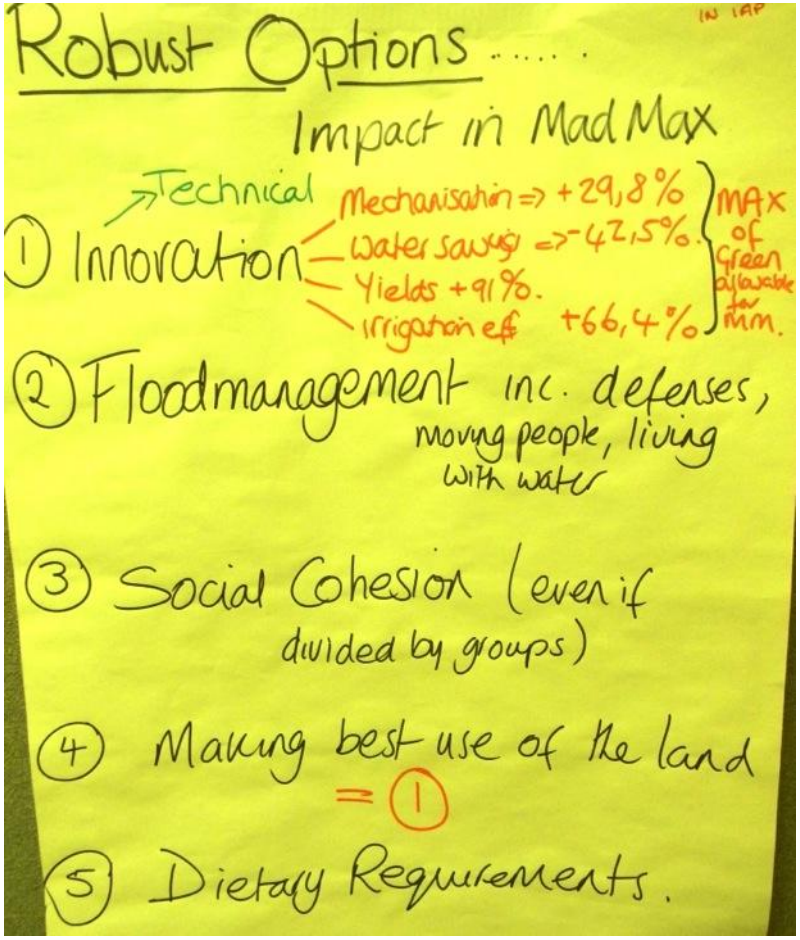


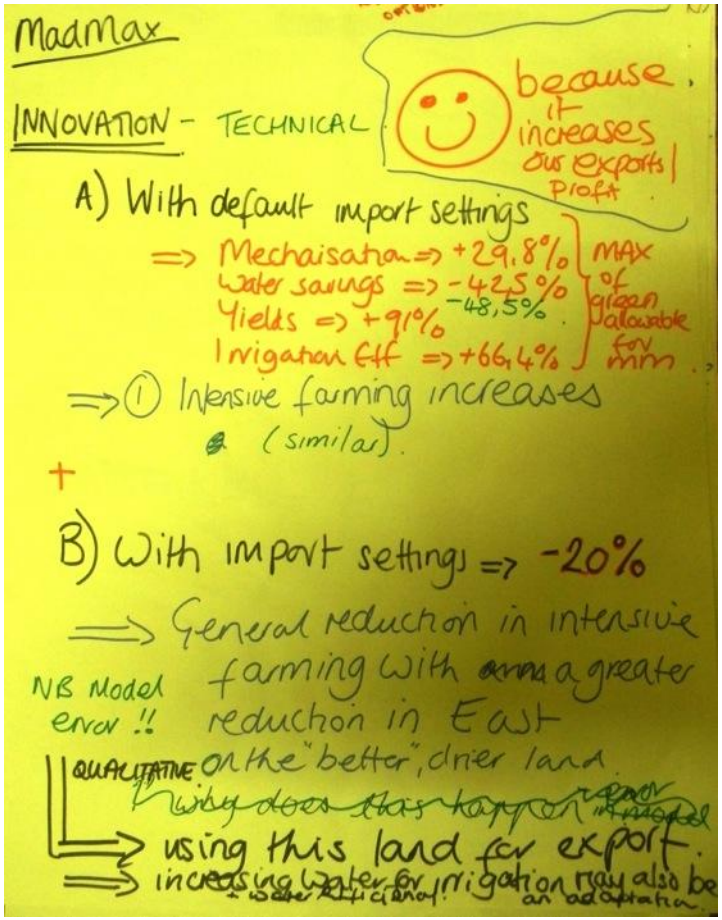


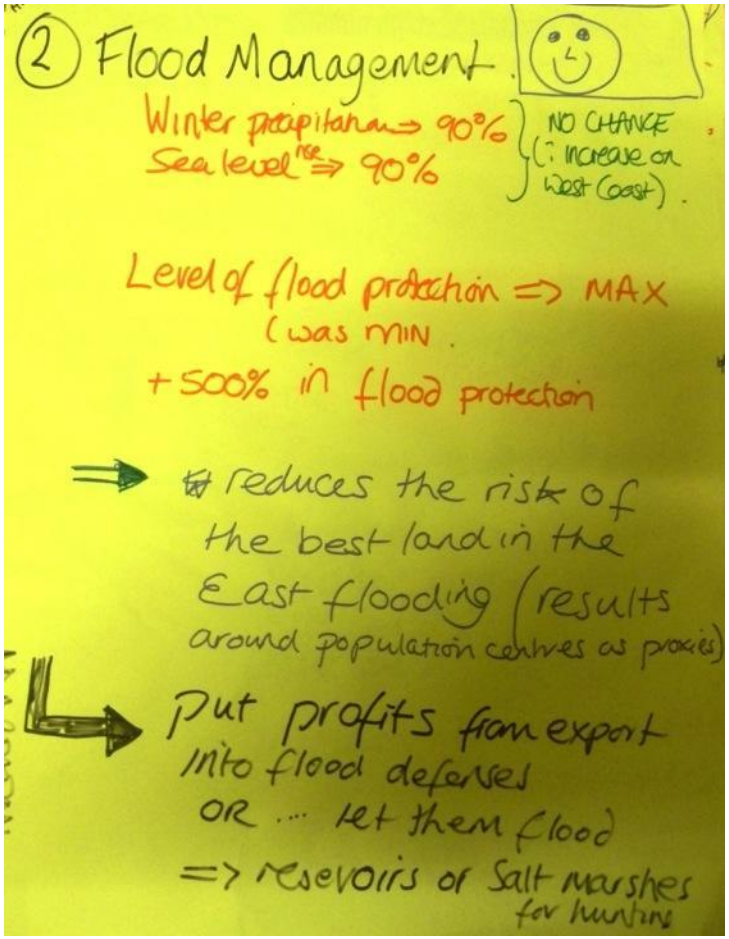

SOCIAL COHESION
SOCIAL COHESION HELPS 'HAVE-NOTS' TO SURVIVE IN DIFFICULT CIRCUMSTANCES
IMPLIES SELF-HELP FOR 'HAVE-NOTS'
E.G. IN CASE OF FLOODING
E.G. ALOTMENTS
SELF-HELP FOR 'HAVES'
EG SAFEGUARDING THEIR INTRESTS BY INFLUENCING GOVERMENT.
EMERGING? ⇆ WORKING TOWARDS?

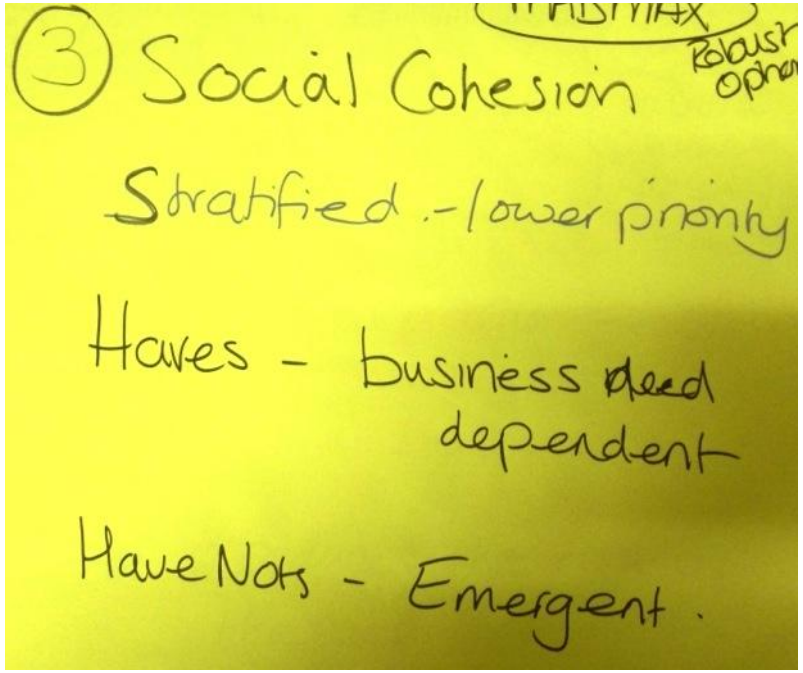

CHANGING DIETARY PREFERENCES/REQUIREMEN
REQUIREMENT RATHER THAN A PREFERENCE.
NOT VALUABLE FOR 'HAVES' HELPFULL
NOT ROBUS OPTION
EMERGING PROPERTY

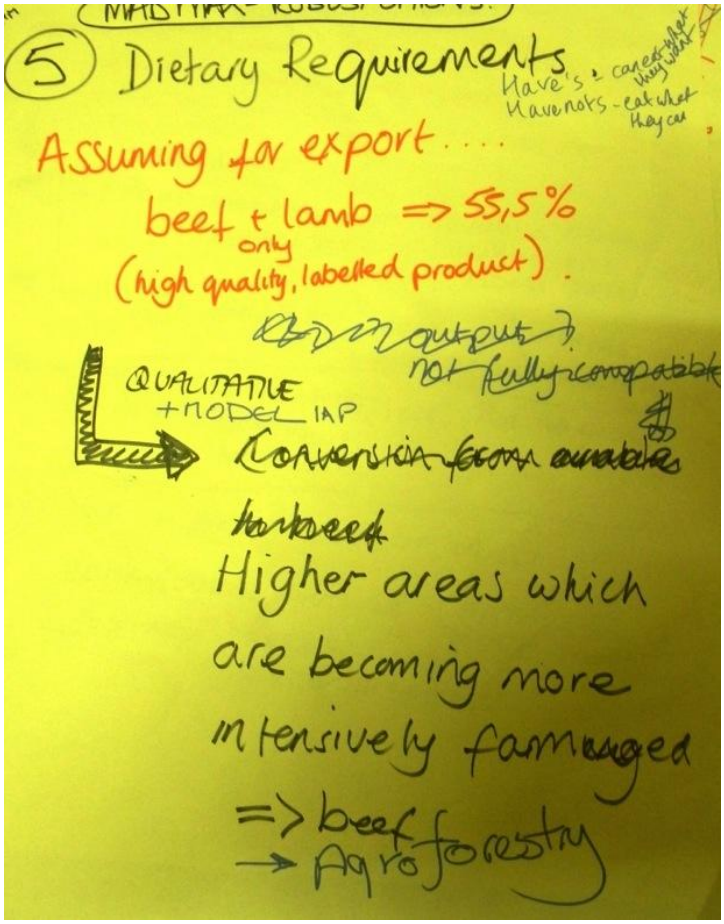
Original output after testing candidates for robust options in Mad Max:



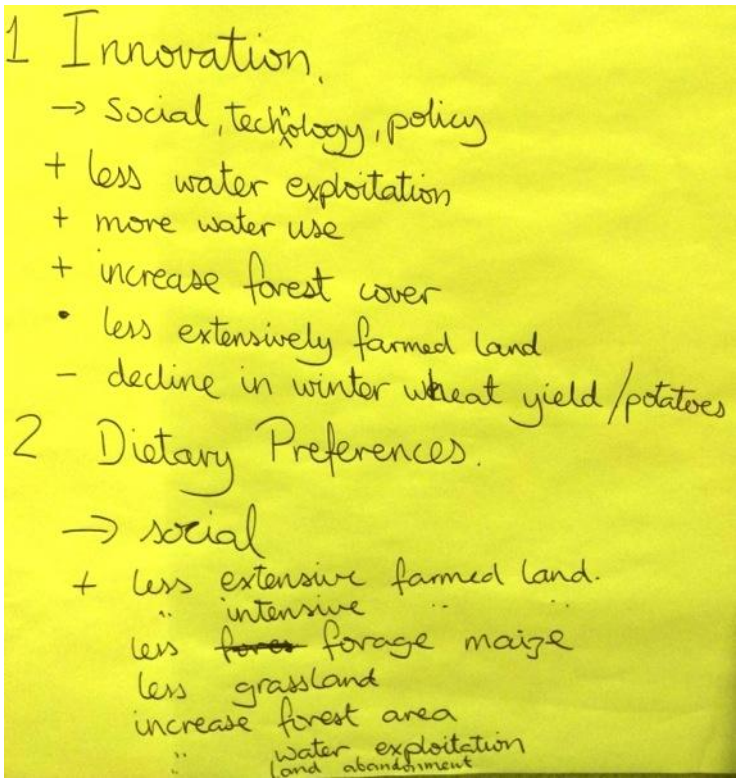


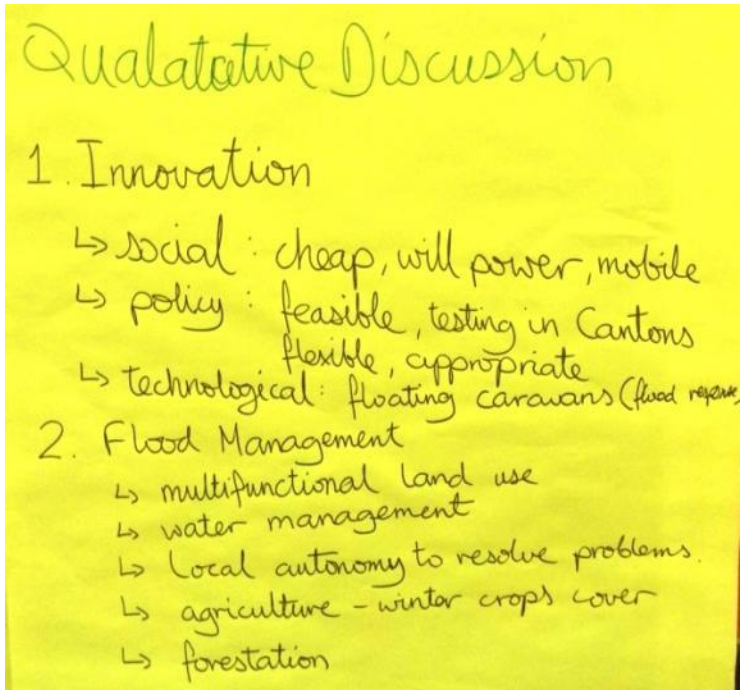

2 Flood Management
Winter precipitation ⇒ 90%
Sea level rise ⇒ 90%
NO CHANGE
(↑ increase on West Coast)
Level of flood protection ⇒ MAX
(was min.
+500% in flood protection
reduces the risk of the best land in the East flooding (results around population centres as proxies)
Put profits from export into flood defenses OR ... let them flood
=> reservoirs or Salt marshes for hunting

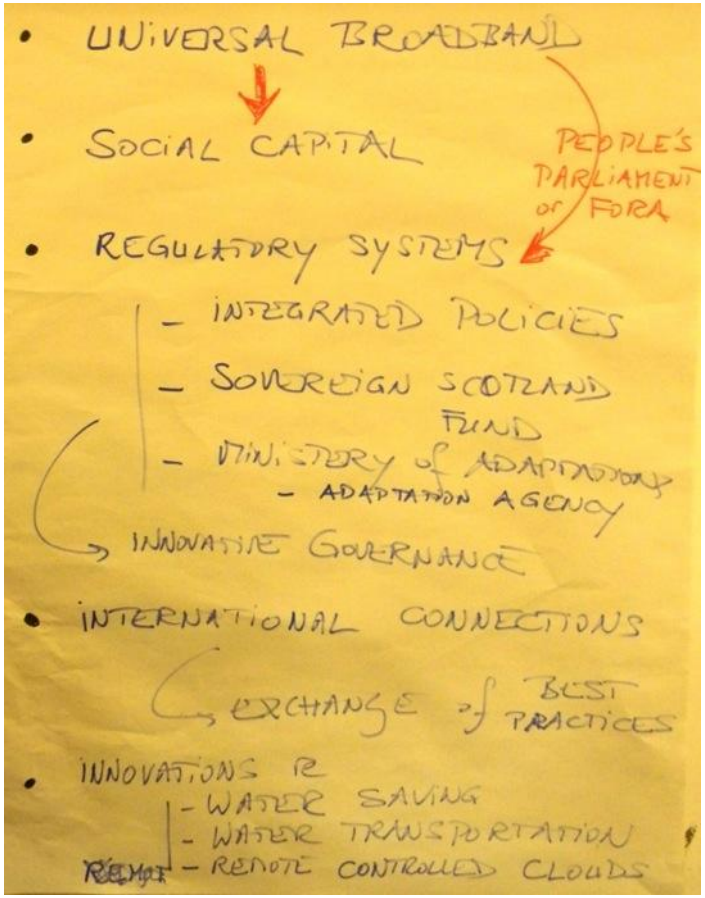

3 Social Cohesion
Robust
Stratified - lower priority
Haves - business dependent
Have Nots - Emergent.

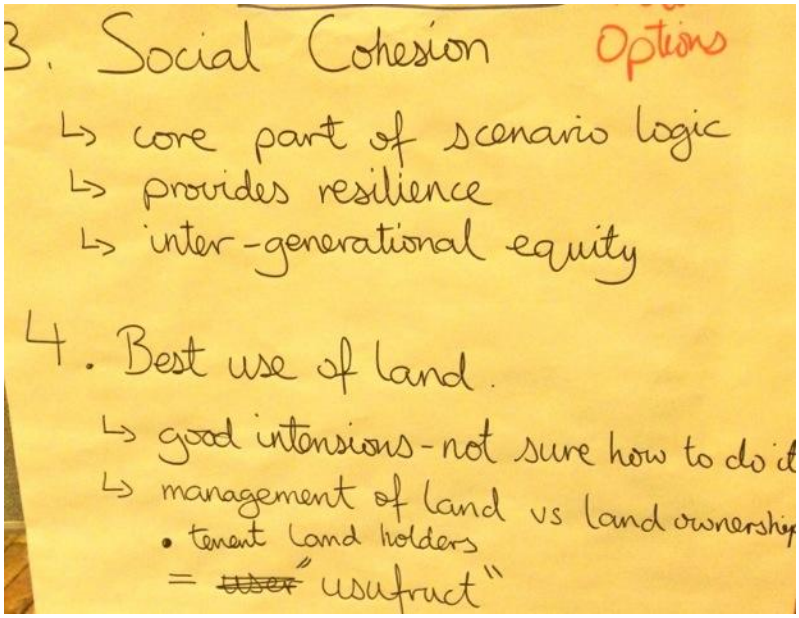


Original output after testing candidates for robust options in The Scottish Play:

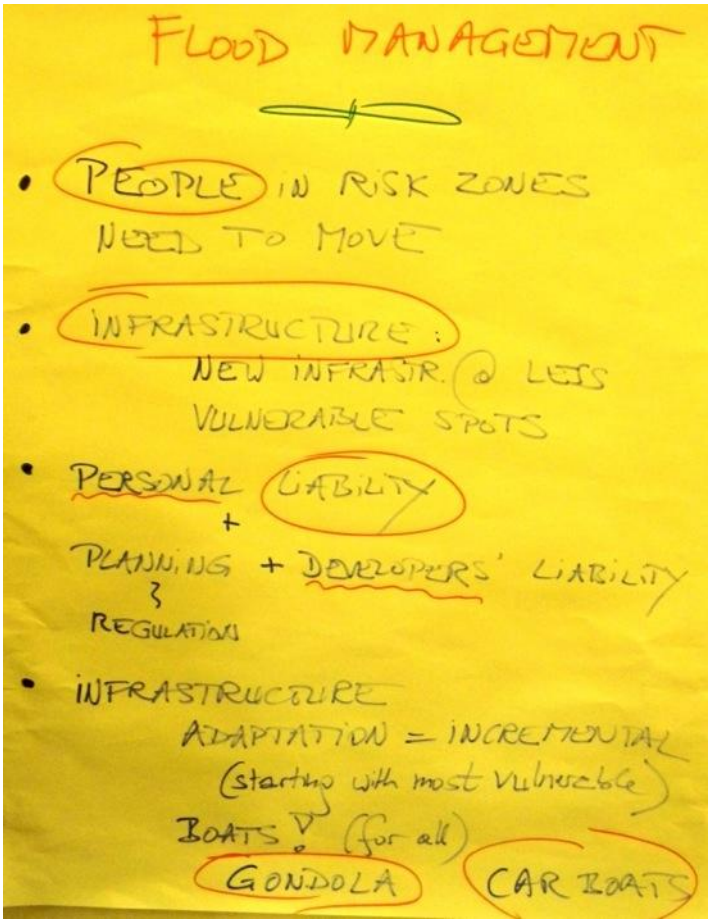


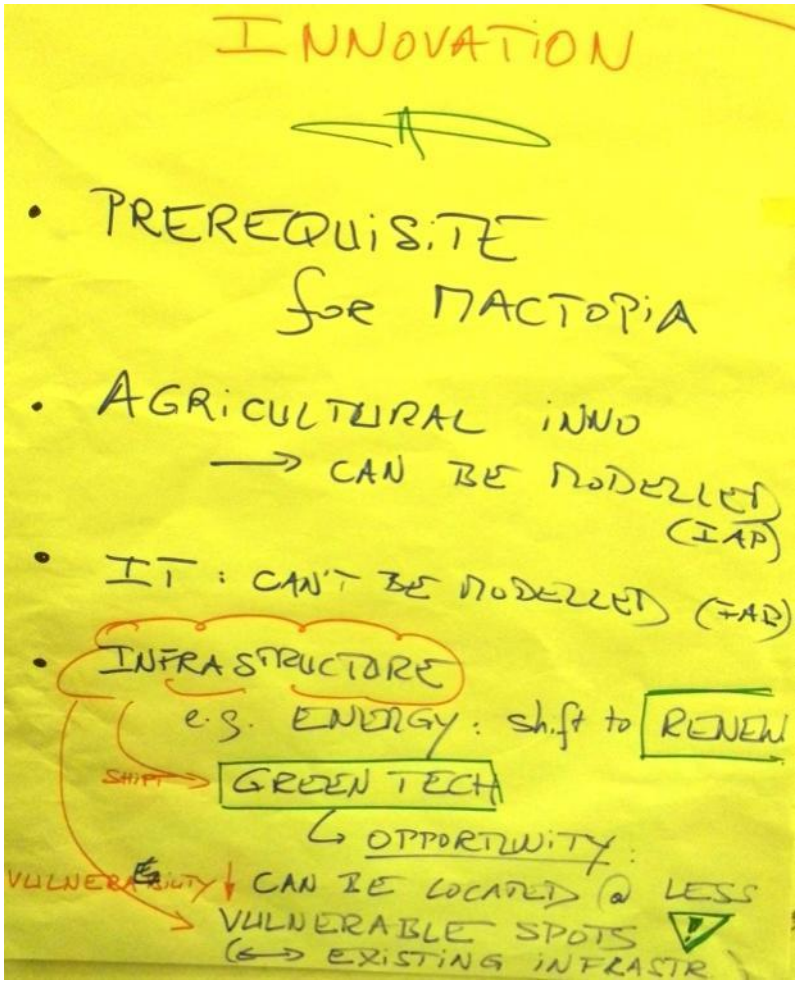

Qualatative Discussion
1. Innovation
↳ social: cheap, will power, mobile
↳ policy: feasible, testing in Cantons
flexible, appropriate
↳ technological: floating caravans (flood
2. Flood Management
↳ multifunctional land use
↳ water management
↳ Local autonomy to resolve problems.
↳ agriculture - winter crops cover
↳ forestation

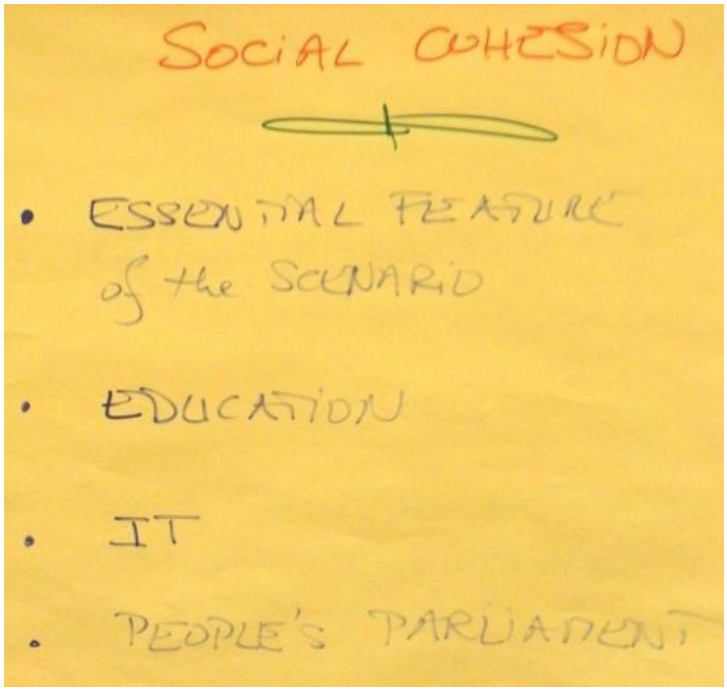

• UNIVERSAL BROADBAND
• SOCIAL CAPITAL
PEOPLE'S PARLIAMENT or FORA
• REGULATORY SYSTEMS
- INTEGRATED POLICIES
- SOVEREIGN SCOTLAND FUND
- MINISTERY of ADAPTATION
- ADAPTATION AGENCY
→ INNOVATIVE GOVERNANCE
• INTERNATIONAL CONNECTIONS
→ EXCHANGE of BEST PRACTICES
• INNOVATIONS R
- WATER SAVING
- WATER TRANSPORTATION
- REMOTE CONTROLLED CLOUDS

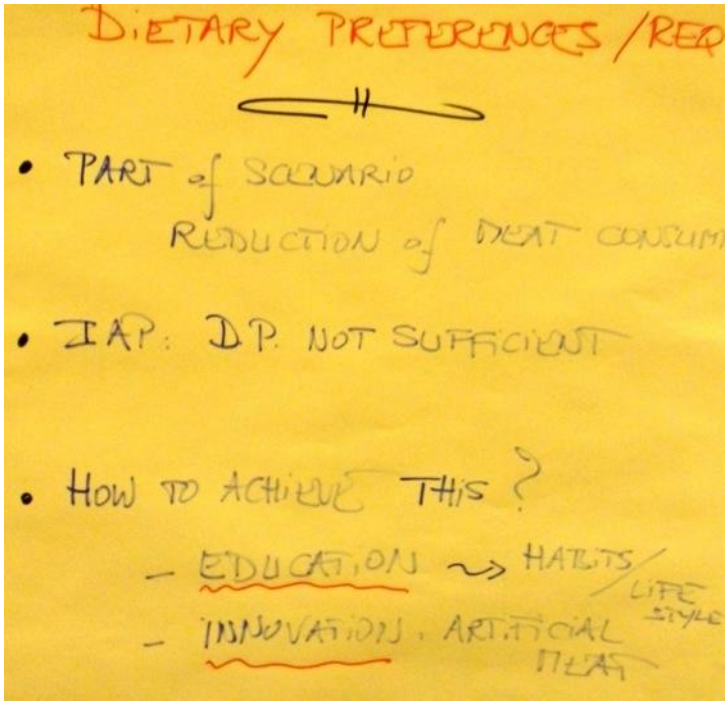


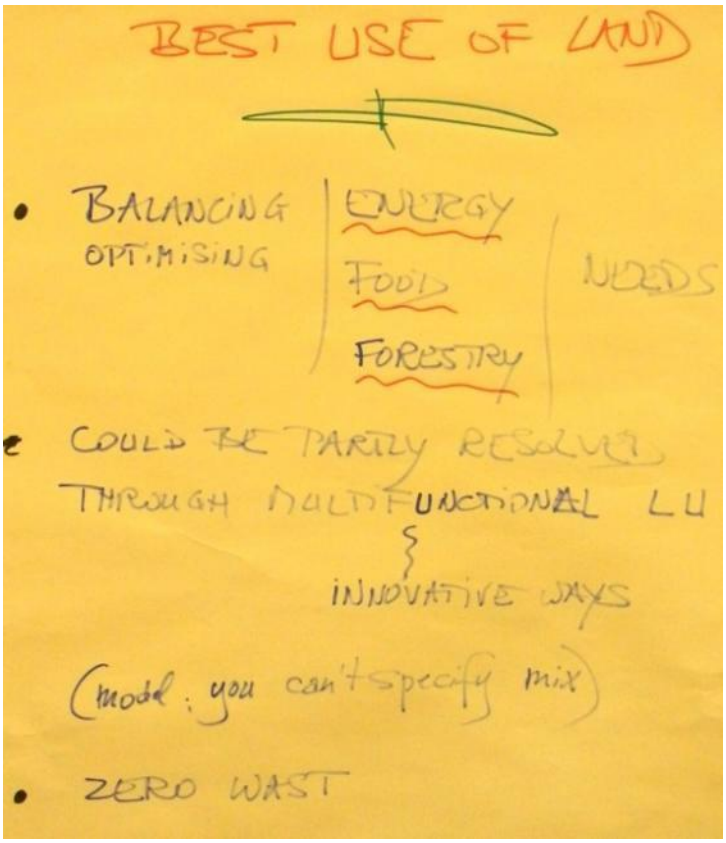
Original output after testing candidates for robust options in Mactopia:




INNOVATION
• PREREQUISITE for MACTOPIA
• AGRICULTURAL INNO → CAN BE MODELLED (IAP)
• IT : CAN'T BE MODELLED (TAP)
• INFRASTRUCTURE
e.g. ENERGY : shift to RENEW
SHIFT
GREEN TECH
OPPORTUNITY :
VULNERABILITY
CAN BE LOCATED @ LESS VULNERABLE SPOTS
EXISTING INFRASTR


SOCIAL COHESION
• ESSENTIAL FEATURE of the SCENARIO
• EDUCATION
• IT
• PEOPLE'S PARLIAMENT


DIETARY PREFERENCES /REQ
PART of SCENARIO
REDUCTION of MEAT CONSUM
IAP: DP NOT SUFFICIENT
HOW TO ACHIEVE THIS ?
- EDUCATION → HABITS / LIFE STYLE
- INNOVATION . ARTIFICIAL MEAT


BEST USE OF LAND
BALANCING
OPTIMISING
ENERGY
FOOD
FORESTRY
NEEDS
COULD BE PARTLY RESOLVED
THROUGH MULTIFUNCTIONAL LU
INNOVATIVE WAYS
(model : you can't specify mix)
ZERO WAST