Factors' Workshop

MacRobert Estate Office, Tarland
Monday, 26th April 2010

Report by Steff Ferguson and Kirsty Blackstock

Summary

An interactive workshop was held to exchange information between the project team (Aberdeenshire Council, Macaulay Land Use Research Institute and Landcare NorthEast) and two of the factors in the Tarland Catchment. The meeting presented the results from the farmers' questionnaire, the flood risk assessment and maps, climate change metrics and some examples of flood prevention measures on farmland from elsewhere in Europe and the UK. The factors provided very useful contributions to the discussion on legal constraints within the land tenancy system, as well as local knowledge on the extent, of flooding and feedback on the issues relating to flood management in the catchment. Both factors had a positive and supportive attitude towards the investigation of flood prevention measures in the catchment. The project will now gather more information about design of measures, financial incentives, and legal conditions before exploring whether a demonstration site could be constructed in the catchment during 2010-2011.

Introduction

The workshop involved 2 factors of local estates and four members of the Aquarius project team in a round table discussion using a workbook that covered farmers' views on the water environment; flood risk in the Tarland catchment; potential climate change impacts; and opportunities for natural flood management (see http://www.macaulay.ac.uk/aquarius/documents.html for the materials).

The objectives of the workshop were:

- To get important information about working with land owners and managers, in relation to farmers as water managers;
- To get feedback on the draft flood risk maps used to assess possible natural flood management options; and
- To update local stakeholders on the 'Aquarius: Farmers as Water Managers' project

Background

The workshop started with a brief introduction to the transnational Aquarius project; and the Scottish case study (Tarland) by Kirsty Blackstock of Macaulay Institute.

Q: The entire project is base on the assumption that climate change is actually happening, what is the evidence for this?
A: CO_2 and green house gases in atmosphere have been increasing for a long time, however rate of increase now is fastest ever recorded, with warming as a probable

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consequence. Forestry, oceans etc remove CO_2; however reduction is less than overall increase. We are unclear of secondary consequences of change on other natural processes e.g. the hydrological cycle. Evidence is difficult to as climate varies naturally, so signal of change not clear above 'noise'. However, if we wait until it is clear, then challenge of tackling it will be much greater. We already have to make 100 year investment decisions, so we must consider potential climate challenges so that we can adapt as changes occur.

Existing Views from the Questionnaire

A short presentation was given on the results from the farmers' questionnaire by Kirsty Blackstock of Macaulay Institute. The main findings were:

- 83% of respondents thought farmers have an important role as water managers
- 44% of respondents had had crops washed out by heavy rain
- The most popular measure that respondents intended to put in place were buffer strips
- 72% thought climate change had not affected their farming business
- Most people don't know what will happen to rainfall, floods and droughts over the next 10 years; although 33% think flooding will increase.

It was noted that 'money doesn't always talk' – there are cultural reasons for resisting natural flood management – particularly as farmers have been asked by government to drain the floodplain since the start of this century (and were doing it before).

Q: Was questionnaire filled in by farmers only or landowners too?
A: Both

Q: Compulsory purchase has in the past been mentioned
A: This is seen very much as a last resort, and undesirable as an option, as it alienates parties involved, creates a bad attitude, and leaves council with land management issues, as well as high legal costs. Aquarius is a purely voluntary and exploratory project to support the statutory Tarland Flood Prevention Scheme and help the TFPS having to use such drastic steps.

One participant raised the issue of the constraints presented by landlord-tenant agreements and legal relationships. A discussion followed, raising the following points:

- Objectives can sometimes differ between landlord and tenant farmer
- If a tenant has an agri-environment scheme on a land parcel, this may need to run its course before the landlord can consider applying for a grant for the area or it could be seen as double-funding the same area
- A landlord can make it a condition of the lease for tenant to carry on with agri-environment management
- Each situation is individual
- 5 year and 15 year lease agreements present problems in themselves, being wither too short or too long to facilitate planning, both for estate and farmer

- Longer term measures e.g. forestry or flood management might require more than 5 years, but taking this land back 'in-hand' is expensive in terms of survey and legal fees, admin (IACS returns) and loss of rental income
- Transnationally, Scotland is quite unique and different form other partners.
- The Tarland case study can feed back to Scottish Government on catchment management with regards to the estate/tenancy issue
- Extensification is not a likely option for Tarland catchment (which is relatively intensively farmed) as it would have knock-on effects on rent paid by tenant, land value etc.
    - There is interest in payments for 'right to flood' although not clear who would pay the presumption is that the Council would pay. Capital grants from SG specifically for flood defence ceased in April 2008 (except for scheme with existing commitments to pay) with the pot of money distributed on a flood risk basis to Local Authorities as part of the overall funding. In practice it will take a few years for the previous commitments to filter through. Having received the capital money the Council itself decides how it should be spent. or who would receive the payment
- Project should consider seeking legal advice on tenancy related issues when investigating possible solutions
    - Contact the Tenant Farmers Forum for more information
    - Would this involve a 'material change of use' (this triggers changes in the lease)
    - How would the maintenance be managed – possibly using a post-lease agreement?
- Even if management is initially carried out by farmer, will need to involve landlord to secure continuity of management, past term of lease

Flood Risk Model & Maps

Steve McFarland from Aberdeenshire Council explained what the term flooding covered; the work that was ongoing to support the Tarland Flood Prevention Scheme; the development of flood risk maps; and the initial predictions of the cost-benefit results based on flood protection. He noted that the new Flooding Act extends the responsibility of the council. The flood risk maps show flooding from the burn (and tributaries) itself but not from overland flow directly from rainfall including water lying in fields. The maps also assume no obstructions in bridges etc; the maps cover 1:5 year return periods (20% chance of occurring any year); 1:25 yr and 1: 200 yr (once in a lifetime) type events. It was difficult to calibrate the model as there were no high rainfall events until Oct 2009 that could be captured by river gauges. Steve explained the standard methods to calculate the costs of flooding; and noted that the cost-benefit ratio limited the money available for works in the catchment for a fairly small scheme for the catchment (estimates suggest a maximum of £0.75 for Tarland and £2.25 for Aboyne over a 100 year time period).

Q: The catchment seems to experience flooding mainly in winter time, when ground is either in grass, or possibly ploughed, but no crops. Does model look at seasonal timing?
A: Yes, using data from river gauges and other data, end of September is the main 'spike' observed. While flooding bare fields seem to have less economic impact, the effects on

water quality and ecology can be drastic – particulates, nutrient leaching – which has knock-on effects on economics too. A calculation to demonstrate amount of soil lost would be a good argument for management to take out to farmers.

Q: Can the council reclaim the funds spent on flood management?
A: In the past, councils could claim 80% back from Scottish Government and in recent years councils such as Moray and Edinburgh have used up much of this budget on large projects. The new system will be that funds are handed to councils to use at their own discretion (not ring-fenced to flooding). Aberdeenshire is average in Scotland in its flood prevention needs, and should receive about £1m per year. Ideally, the council would design for protection now with the possibility of adding to (rather than having to pull down and start again) as time goes on and as necessary. May not be able to justify a measure that protects for +1:200 year scenario but as a minimum should aim for 1 in 75 year for insurance purposes.

Q: The catchment area seems to be reduced in model maps – excluding areas further up catchment such as Stoneyford Burn – why?
A: The modellers restricted themselves to the land nearest settlements and most likely to flood from the burn. As a general example, about a minimum of 1million m^3 would need to be stored to protect Aboyne for a 200-year event. However the further up the catchment, the more storage would be necessary, so it was not sensible to model the top of the catchment. Ideally one would build a large storage area immediately above properties that need protection, with full control (sluice), but these require staff to manage them, so usually a more passive model is adopted, which will need to be bigger because it will start taking water at an earlier stage. Also the further upstream it is, the less impact it can have on the target areas and larger the storage area needs to be. Taking account of climate change predictions, and a 200-year event, 1.5 million m^3 would be required above and beyond what would be already flooded.

Q: What about Tarland?
A: For Tarland, 200,000m^3 would be required for a +1:200 year event (20 ha at 1m deep above what water would be lying anyway). This would be subtracted from the Aboyne requirement, although the relationship between the 2 areas is not a linear one.

Q: Would you say the less engineering the better?
A: Yes, but need to bear in mind that sometimes one larger scheme is a lot more cost effective, as agreements and other fixed cost overheads can be expensive, although lots of small schemes may have environmental merits.

Discussion on above point:

- Sometimes minimal effort can work – e.g. SRDP on MacRobert estate, or simply taking a digger for a few days to a site
- Atkins will model the 6 best sites and pursue these to see which is most feasible from their perspective – results available in June 2010
    - Atkins note that there will be much flood relief from smaller schemes in the larger events
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- From an estate perspective, likely several smaller schemes would be preferential, rather than one farm having large areas under water during floods.
- One big scheme in the Coull area may suffice for Aboyne, single retainment structure flooding to about 4m max depth
- For Aquarius project, the plan is not to address whole catchment, but pilot in sub-catchment to feed info into larger FP scheme.
- Danish river restoration project to be followed up – example of river re-meandering
- What are the diffuse pollution impacts of flood water and field drains?
- How would the water that has been impounded get back into the burn? It may get trapped behind the existing levees. These would be lowered so gravity allowed the water to flow back, or pipes could be used to drain the stored water.

Q: Has river restoration, e.g. re-meandering been investigated for flood storage?
A: More information on various types of management in terms of flood storage potential is being sought, but little data available at present. The new Flood Act specifies that Natural Flood Management to be used where possible. Council have a project in Marykirk that is considering re-meandering. One person has canoed down the Burn from Coull to Aboyne and noted the fallen trees and natural hazards that were slowing the flow already. This is not taken into account in the model.

Q: Are Atkins looking at Tarland too?
A: Yes. They are looking at several parts of the catchment. E.g. at Gellan, if a retainment structure was put in place to store all water from the sub-catchment to the west, this would manage just 9% of the water entering Aboyne, 91% would still be unattenuated and pose a flood risk.

Q: What about above Coull Bridge?
A: Volume above the bridge amounts to 61% of flow into Aboyne according to the model. The relationship isn't linear, and is influenced by speed of precipitation entering watercourses etc.

Q: How will a bigger structure work?
A: Example – Cowbridge in Wales. Banks not that high, but will fill up over the lowest points. Designed to overspill close to structure when desired volume of storage is reached, to then release slowly downstream, and clear a 200-yr event flood storage within 36 hours off the land – taking the 'peak' out of a spate event. There was debate over how to drain the overflow water back into the main channel, the need for safety overflows, screening to stop blockages and learning from SUDS design. It would be useful to know how reprofiling the channel would affect the storage area and model.

Q: What about the fast run-off we have seen this year over frosty ground?
A: Yes, this has been unusual, with frost and large volumes of rain, and ground saturated. The Model looks at different scenarios, short heavy rain, long prolonged rain etc. The model will however always be imperfect and will not allow for all eventualities – it can

merely provide an indication. Participants noted that the rain events in Oct/Nov 2009 created new rivers along roads but did not impact on the main burn at all – seems that

Tarland Burn could cope with the rainfall but smaller tributaries and coastal burns could not. The water in the burn was a 1m less than it was in 2002 (when the last major flood occurred). We think 2002 was a 1:50 – 1:100 year event but difficult to know without gauges in the catchment.

Specific points raised about maps:

1 in 5 year event:

- The maps do not show an area to the north of the village, adjacent to community wetland, which has been flooding, affecting neighbouring gardens – this is because the model calculates for water in burn only, and does not pick up run-off, which is what will be causing this area of flooding. This is a concern, as run-off can increase volume needed for flood storage.
- Flood modelling around Coull and Aboyne Castle was though to be accurate, except area around castle has only flooded once in past 25, not once in 5.

1 in 25 years event:

- The flood area in tributary to West of Gellan needs to be extended, as noted during farmers' workshop – not deep but always wet.
- Area to west used to be called Lake of Tarland', now a bog. A retired farmer (details supplied) may have old maps and local knowledge and background information.

1 in 200 years event

- Flooding seen near Aboyne had not been seen before (1970- 2000), and did not reoccur in 2009/10. Map is accurate for urban flooding in Aboyne – water levels half way up windscreen outside Strachans

General comments:

- The field immediately east of the Tarland Waste Water Treatment Plant has standing water on at the moment, as shown on map, although this is likely to be from drainage, rather than flood water. Is the WWTP at risk from flooding as well as reducing the capacity of land to store flood waters?
- Programme models depth of water as well as extent of flooding, however this is not shown on these maps.
- It is important to recognise that flood prevention will need to provide additional storage to the existing flooded areas, hence existing flooded areas may offer only limited storage unless they can be made much deeper.
- The model also has the capacity to run through some scenarios, such as tweaking for climate change predictions

4. Climate Change in the Area

Keith Matthews, from the Macaulay Institute, introduced some climate metrics for the Tarland catchment, comparing past data with projections for 2070-2100 (Infrastructure uses a 100 year timeframe for investment).

The overall patterns are to have wetter springs and warmer drier autumns, with more access problems in the spring but more potential for grazing stock into the autumn, if late summer drought does not impact on grass production. This may have an impact on whether winter or spring cropping is used and on animal housing/feed regimes. Extreme events could be more severe and more frequent. Tarland has less change in field access indictors than other east coast case studies, due to lower evapo-transpiration.

Q: How does this winter (2009-10) compare to model predictions, with the prolonged frost period (only 9 days above 2^{o}C, all in March, since beginning of the year)?
A: The main feature has been the volume of snow and extremes of cold temperature. This year illustrates the variability that is not communicated by using averages. The range of values around an average will change in the future. Data sets have 'error bars' around average, however to simplify the data presentation, these were left off the set on display. The metrics are for 2070- 2100; so there is long time for these changes to take place.

5. Natural Flood Management

Kirsty Blackstock presented some photographs of existing natural flood management measures and outlined some data from the questionnaire on attitudes to NFM.

Discussion on above point:

- Farming should not increase flood risk to houses, but have not been held responsible before. They should be paid for providing this new service.
- Farmers' workshop brought out some interested individuals, which are being followed up.
- Both estates attending workshop are prepared to consider and assist in local flood management planning and development
- Ditch cleaning is still seen by many as important water management tool, showing a lack of understanding of catchment hydrology .
- Dredging is only effective in big, slow channels, not fast flowing burns
- The landscape looks unchanged but the characteristics of drainage have changed in the last 50 years, with artificial drainage affecting hydraulics and hydrology
- The landlord-tenant relationship is important in the Tarland setting – a way to address the situation may be to speak to tenants first, then involve estate. If tenant is not in favour, maybe estate can step in.
- Financial incentives need to look at all the costs and benefits, including opportunity costs, loss of other land uses, land value, rental income, increased management needs – damage function is greater than the full value of the crop lost that year.

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Next steps

We will address the main questions arising from these meetings in our research. If possible, we will put the research into practice via a demonstration site in the catchment. We will feedback progress via newsletters and possibly another meeting, if there is sufficient interest, in winter 2010-2011.

Please contact Linda Mathieson on 01467 628380 or Keith Matthews on 01224 395271 for more information.

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