

The role of Internal Drainage Boards in managing water levels: Best practice and potential future roles.

Annex I: Notes from engagement

R&D Project Record WT1512/PR

Produced: May 2013

Defra Water Availability and Quality R&D Programme

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Statement of use

This report is part of Defra's Water Availability and Quality Research Programme. The project is designed to support Internal Drainage Boards (IDBs) in sharing best practice on increasing local resilience to climate change and learn from IDBs best practice as we look to develop more local and integrated approaches to water management.

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Annex 1 Notes from engagement

1.1 Lindsey Marsh Drainage Boards

Andrew McGill and David Sisson

Impacts and assessing the risks of climate change

Main risks posed by climate change are:

- Rising sea levels
- Increased rainfall (causing flash floods and increased surface run-off , mainly a problem for urban areas)
- Rising water table

These will affect industries (such as tourism, farming), as well as infrastructure and local communities. Both drought and excess rainfall cause damage to roads. Within the Drainage District climate change is predicted to cause changes in weed growth (type and density) which will cause choking of the waterways and obsolescence of water management structures.

Andrew and David have not seen evidence of climate change within the last 30 years but have noticed an increase in extreme events recently, including excess rainfall occurring in 2000, 2011 and 2012.

Lindsey Marsh Drainage Boards use climate change projections from Defra and the EA and also from the UKCIP.

Plans and strategies for climate change

Commissioned a report on how to deal with climate change (will send us a copy). Whenever they renew or update pumps or water control structures they consider climate change potential and whether there is the opportunity to increase the capacity of the pump/waterway.

David Sisson is undertaking a research project. In 2011 Lindsey Marsh Drainage District bid for Defra funding for research regarding a sustainable pumping project which investigated the possibility of harnessing natural processes to retain water in systems and control water levels, including investigating the role of evapotranspiration (information in Defra workshop information, report in production). Phase 2 of the project is to plan full scale field trials of these natural processes and if they are found to be successful they will be rolled out across the district. Beckingham marshes are currently operating as a pilot; the majority of the area is farmland with some belonging to the RSPB. Water is pumped into the Trent and water levels are balanced between maintaining farming land use and the wetland habitat for birds and being able to evacuate water quickly. This system depends upon the River Trent. It

uses gravity doors and a pumping station. The Trent may be the heaviest silt laden river in the country and there is a risk the gravity doors will be blocked. They need a higher inland level to balance the potential of the gravity doors to block (will send over papers).

Another method for managing water is using low level berms which achieves additional storage and increases biodiversity.

Working with others

Lindsey Drainage District works with:

- County Council
- Environment Agency
- District Council
- Lincolnshire network

Have people at all levels to the Lincolnshire network (Gold level – command, decision making; silver level – operational and bronze – incident, on the ground decision making).

Lindsey Marsh Drainage District has contracts with the EA to maintain some of their water courses, for example at Newark. Maintain structure, weed screens etc.

In Crowle, flooding of properties was potentially due to the capacity of EA watercourses not being as high as it could have been, and also the foul and freshwater capacity of water companies not being sufficiently managed. Recommend further interactions with water companies, for example a liaison officer to turn up to IDB meetings representing the water company. Problem of public vs private sector aims and objectives when working with water companies.

Work with LLFA, EA etc. to provide solutions for local communities before, during and after flood events. In general the IDB has good communication with the EA, however they feel there is dislocation between intent and action. Good policy but difficult to implement. The EA is process driven.

Lincolnshire Flood Risk Management family is well integrated and includes the Lincolnshire flood resilience forum and flood and drainage partnership. North Lincolnshire interactions are less advanced than the rest of the area. Nottinghamshire main interactions are between the IDB and EA (other areas are improving their interactions). During flooding, interactions and partnership working are relatively common. During droughts it is an ‘every man for himself’ mentality.

Current practice

Within sub-catchments Lindsey Marsh IDBs carry out modelling to ensure water management capacity is sufficient which leads to increased organisation within the company. They have a mobile pump and can send the pump and personnel to access incidents across the drainage area.

IDB deals with excess water by transferring water between catchments as some storms are localised. They are also developing drainage systems and using on-line storage which benefits biodiversity. IDB recently built 2 specific flood storage areas in response to plans for an urban development which may cause flash flooding events. IDB has regular upgrading of pumping capacity where possible and increasing pumping capacity. Where not possible they increase storage within the system. They have invested heavily in the last 20 years in improvements to systems.

Lindsey Marsh Drainage District is linked to flood forecast centre and Met Office. Have in house capacity for modelling (all catchments) to highlight areas of potential problems. Also undertake a sensitivity analysis to consider, for example, the effect of sudden summer storm events. Use telemetry which is mainly level activated.

Meeting water needs

Mainly undertake flood storage rather than water retention for droughts as this is dealt with through permanent or temporary impounding structures focused on areas of water stress. In Skegness (number 2 holiday destination in UK) David Sisson implemented flood protection levels, including a flood storage area, which enables further development.

Within the Lindsey Drainage District water is transferred from main rivers at high levels. They try to maintain as much water for as long as possible in internal systems and use external sources where possible.

Consider Italian Land Drainage System River Po.

Lindsey Marsh Drainage District occasionally move water for abstraction, however the call for irrigation is low in many areas as the crops do not require much water. Isle of Axholme has more abstraction. Trent water is not always good enough quality for irrigation. In general water transfer for abstraction is done only on a small scale. (Some IDBs such as Witham Fourth and Welland & Deepings rely far more on water transfer).

Future roles for IDBs

Large IDBs now have in house skills which make them capable of designing and implementing flood storage areas (for example at Skegness more than 10 years ago) in a cost effective manner. These skills are available but not exploited by the EA and LA. IDBs could assist development, currently they advise and comment on planning related to flood risk management and water level management related to developments. IDBs must consider the balance between having a winter flood reservoir and storage issues (consider Italian River Po example).

The role of IDBs in the future will depend on funding. Also they may not have sufficient power to provide winter storage areas. Lindsey Marsh Drainage District is constantly investing in ensuring high standards as this will contribute to watercourses resilience to climate change.

Contribute to reducing their carbon footprint by maintaining storage capacity to ensure less pumping is required and therefore less electricity. Do not currently have any green energy as needs to be financially more attractive to off-set the costs of it.

1.2 Ouse and Humber Drainage Board

Andrew Morritt

Impacts and assessing the risks of climate change

The Ouse and Humber drainage district is likely to be impacted by climate change. The extreme rainfall events of 2012 have given a good indication of the likely impacts of climate change. Over 60% of the Boards drainage district discharges into two main arterial asset systems managed and operated by the Environment Agency; the River Derwent and the Market Weighton Canal. Vast swathes of land adjacent to these watercourses suffered repeated and protracted flooding as a result of the heavy rainfall. High retained water levels in both these assets systems resulted in many of the Boards own gravity assets being unable to discharge efficiently, thereby leading to the waterlogging of land up to 2km from the main arterial assets.

The increased frequency and magnitude of peak rainfall events has had a significant impact on the structural integrity of a number of the Boards assets, resulting in the need for additional repairs. There was also a 100% increase in electricity costs due to additional pumping requirement at the Boards 17 pump stations. It is reasonable to assume that climate change will create similar issues thereby increasing general operational and maintenance costs. The majority of these additional costs have been covered via the Boards capital reserves; however this is not a sustainable position beyond the short term. The restrictions on raising capital funds for anything other than risk to residential properties, the reduction in revenue budgets imposed upon the Environment Agency and the current pressures on LLFA budgets present a credible risk to the long term integrity of infrastructure, transportation links and businesses vital to the rural economy, well-being and sustainability of many non-metropolitan local authorities.

Climate change projections are taken into account through the use of hydraulic modelling for all proposed new schemes and interventions. Climate change implications will be taken into account when assessing any major refurbishment/reinstatement works.

Plans and strategies for climate change

The Board has recently received approval for the construction of a flood alleviation scheme to improve flood risk to the communities of Eastrington & Laxton. At a cost of £1million the scheme will improve flood risk to 272 properties and create 8.85ha of OM4 habitat. The Board hopes to receive approval in the very near future for a second flood alleviation scheme for the communities of Gilberdyke & Blacktoft. At a cost of £1.45million this scheme will improve flood risk to 883 properties and create 6.04ha of OM4 habitat. OHDB are also working with a national property developer involved with a proposed major housing project

within the Boards drainage district. Should this scheme come to fruition, major improvements will be made to the assets protecting the town of Howden.

Working with others

OHDB works closely with Environment Agency and LLFA officers at both senior and operational levels, to monitor and manage water levels within its drainage district. Partnership working is an integral part of the Boards management philosophy and practices. OHDB also work in partnership with the Environment Agency, tenant farmer and conservation groups to manage improve and maintain the flood storage and habitat potential of the Broomfleet Washlands adjacent to the Market Weighton Canal. Over £35,000 has been invested in monies and time in lieu to remove scrub, enhance channels and develop a management plan for two flood storage cell covering some 38ha.

OHDB has very good relationships with organisations such as the Yorkshire Wildlife Trust, Natural England, East Riding of Yorkshire Council and the National Farmers Union. It is only by clear and effective partnership working with these organisations and stakeholders that the impact of climate change can be addressed effectively. Board officers play a key role in a number of important regional bodies, e.g. Yorkshire RFCC (Independent Appointed Member), Humberhead Levels Nature Improvement Area (Executive Member & Chair of Steering Group), CWWW Waterways Partnership (Executive Member & Chair of Technical Forum), Humber Strategy steering Group, East Yorkshire Biodiversity Partnership, etc.

Current practice

Our particular area of East Yorkshire very rarely suffers from a lack of water as a result of a generally high water table. Approximately 40% of the drainage district discharges through Market Weighton Canal. Water levels in this asset system are controlled by the Environment Agency. The systems suffers from gradients of between 1:8,000 and 1: 12,000 dependent upon tidal influences and therefore is very slow flowing and prone to excessive growth of still water vegetation. This became a particular issue during May to July 2012. Whilst being unable to prevent overtopping on the undefended sections of the asset system, through close liaison and coordinated maintenance activities the impact was greatly reduced. OHDB maintained close liaison with EA Flood Managers throughout 2012 to ensure that its pumping activities did not compromise asset integrity and to ensure discharge rates were maximised.

The Board shares Environment Agency telemetry data from the main arterial asset systems as well as utilising the Met Office Hazard Manager system to aid the management of its assets.

Meeting water needs

Water levels within asset systems are maintained as low as feasible (or as allowed in areas subject to water level management plans) in order to maximise 'in channel' storage. Additional storage in extreme events utilises identified and designated flood plains adjacent to the main arterial asset systems. The flood alleviation schemes highlighted in Answer 2 incorporate circa 15ha of flood storage area. The Board actively promotes the development

of flood storage areas to mitigate the impacts of high retained water levels and the expected impacts of climate change. However many landowners are reticent at present, either due to the impact upon the profitability of their business or they are constrained by the size of their landholding.

Generally high water table levels in the area normally result in sufficient water for abstraction. This is usually aided by good levels of rain water run-off from the adjacent Yorkshire Wolds. There is potential for additional water storage in the abandoned upstream section of Market Weighton Canal. Initial informal discussions have been held with a number of stakeholders but as yet no project has been developed.

Future roles for IDBs

IDBs could and should adopt a role more in line with the needs of water level management rather than the mitigation of peak events. Implementation will have to account for regional hydrology and topography and where appropriate IDBs should be the responsible body for promoting and establishing efficient water resource management within the drainage district.

At present funding for major water management interventions is very difficult to access. Whilst IDBs operate many kilometres of watercourse that has potential for additional water management capabilities, due to the lack of residential properties in the immediate vicinity, FDGiA is extremely difficult to access. Whilst many IDBs may be willing to contribute to such works, they are unable to raise sufficient revenue in the current public sector financial climate. This problem is further exacerbated by the fact that IDBs are unable to raise funds on the open market and that any application to the Public Works Loan Board requires an accompanying sum of grant in aid.

The construction of such works is likely to be on land adjacent to the watercourses involved. At present there is insufficient financial incentive to stimulate interest from these landowners or to compensate them for the required change in land use/farming practice.

Given the shift in focus and prioritisation of residential flood risk of the Environment Agency, in conjunction with recent reductions in their revenue budget, IDBs are ideally placed to assume operational and management responsibilities for many asset systems in their drainage districts that are deemed at present to be of a medium/low risk to residential properties. Due to the topography of the landscape, many IDB systems are dependent upon the effective operation of these medium/low risk assets. If current reductions in the maintenance spend on these assets persists much beyond the short term, this will undoubtedly lead to a reduction in the efficiency of many interlinked IDB assets. Whilst acknowledging the limited residential risk these assets represent, many play a vital role in maintaining effective communications/transportation routes and business needs vital to the sustainability of the rural/semi-rural economy and the communities they support.

With effective representation of local communities, business and LLFAs on their management committees, IDBs are ideally placed to deliver the prioritised needs of their local/regional stakeholders. However as might be expected, funding is a major consideration

for all public authorities and IDBs are no exception. Whilst many Boards have the agreement in principle and willingness of their ratepayers to raise the necessary funding to accept additional responsibilities and duties, the impact upon the Special Levy is a major concern for local authorities and their representatives.

Also IDBs are concerned that as a result of the revenue pressures experienced by the Environment Agency, they are at risk of a reduced benefit from the precept monies paid to the EA. Whilst acknowledging that these monies are for activities upon the wider assets systems associated with their drainage districts, rather than ring fenced to asset systems within their individual drainage districts, IDBs are concerned that these monies are likely to be directed to more highly prioritised residential flood risk issues, that may potentially have a detrimental impact upon the general flood risk with their drainage districts. At present there are guidelines for the de-maining/transfer of assets, as well as the possible use of Section 13(4) FWMA 2010, but as yet there is no clear methodology for IDBs to seek a proportionate reduction in precept associated with the adoption of a de-mained asset. Given the potential impact upon the local infrastructure etc. as previously mentioned and the significant contribution made to the precept by the Special Levy provided by LLFAs, similar concerns were raised by the non-metropolitan LLFAs at a recent Yorkshire RFCC meeting.

IDBs and non-metropolitan LLFAs have also raised concerns with the RFCC that the current focus on residential flood risk for both capital and revenue expenditure is too narrow and prescriptive and does not allow enough scope for LLFAs/IDBs to adequately account for other socio-economic benefits that might be more pertinent to their social and economic profile and priorities of the communities they serve.

1.3 Black Sluice

Ian Warsap

Impacts and assessing the risks of climate change

- Increase or decrease in rainfall, therefore changes to water levels (increased costs due to high water level pumping or bank slips due to low water levels)
- Changes to tide levels and gravity flows into tidal rivers
- Changes to vegetation growing seasons
- Biodiversity changes (nesting birds)
- Water abstraction
- Invasive species

We do not have direct access to climate change projections; this will be reviewed in the future.

Plans and strategies for climate change

We do not have any strategies to manage water levels specifically for climate change. The overall standard of service in the Board's catchment area is governed by the standard of

service of an EA watercourse which only gives 1 in 10 year standard of service. At the moment we have to accept the standard of service will fall if river flows increase with climate change.

Working with others

We work in partnership with our Lead Local Flood Authority (Lincolnshire County Council) and the other partners. There is scope to develop adaptation to climate change, this will require direction. We have in the past worked with/for the EA and this is about to reconvene, we have also carried out limited repair works for water companies (bank wash-outs). Working together in whatever format particularly as partners is very useful. Links are developing through the Lincolnshire Flood Authority with other partner organisations and this is encouraged.

There are several independent organisations IDB's would have to work alongside, the National Farmers Union being a good example.

Current practice

Every event we encounter could be used as an example. An overall example would be the fact our 34 pumping stations have pumped over 12 billion gallons of water through our pumps between July 2012 and January 2013.

Another example when we have too little water would be that through our remote telemetry we can monitor the reduction in rainfall and subsequent water levels and switch pumps off or reduce pumping hours in order to retain water levels in our catchments.

We have a telemetry system and monitor water levels in all catchments. This helps us to control pumping stations to retain the best water level for the prevailing conditions.

Meeting water needs

We increase water levels in many of the Board's catchments during the summer period and during drier periods. We also actively help farmers and managers of nature reserves to store water for use in drier periods. Particularly we retain water for the RSPB to extract and store on the Frampton Marsh nature reserve.

We have not transferred water during drier periods, we do have limited opportunities to do this through our systems.

We do not move water due to abstraction requests we simply 'hold' water by reducing our pumping hours.

Future roles for IDBs

This obviously depends on what effects climate change will have on our catchments and the associated costs. Licensing for water abstraction and control could be seen as one, water storage schemes could be another.

Resource availability and costs will always be the barriers to overcome, whatever these roles may be. Labour, plant and materials are included as a resource.

The finite balance between high water levels causing flooding and land drainage problems and low water levels causing crop loss and land erosion.

Other information

We have no revenue stream other than our rates and levies unless the future increase in costs will attract funding?

Our current ability to cope with extreme weather events is limited by the EA main rivers we pump water into (two pumping stations do discharge over the sea defence which has no limits).

Climate change adaptation is extremely important and should be directed through Government Departments. We need to make sure future direction is developed by leading organisations and not lost in red tape and non-committal agencies.

We have many schemes in place or on the design table for future works, please let me have any specific topics you are focusing on and I will get back to you with some notes.

Feel de-maining should be an option for some water ways to enable IDB to undertake work on what are currently EA managed watercourses.

1.4 Romney Marshes

Nick Botting

Impacts and assessing the risks of climate change

The main impact of climate change is on the IDBs ability to react to extremes of weather to suit all land users and beneficiaries. The IDB must take into account how they would be affected by government policies that come out. On the ground the IDB focuses on their ability to react to extremes of weather, for instance the drought and extreme rain seen last year, and try and predict weather patterns in order to improve their reaction to them. What they try to do in terms of their water level management is to keep everyone happy and with extremes of weather such as summers storms when there is already a lot of water about they must consider how best to deal with it without upsetting anyone.

The IDB does not use any climate change projections at the moment, due to it being an unknown science and hence potentially unreliable.

They do have a good relationship within the Environment Agency regarding any predictions for the short term.

Plans and strategies for climate change

Their traditional approach is to follow long term, established weather patterns, for example wet winters and dry summers, as a result they try to get rid of water towards the end of autumn into winter and try to stock pile water in very late winter/early spring. But they have noticed in the recent couple of years there have been occasions where they have had to adapt their approach to a very short term pattern.

They are completely dependent on the EA when getting rid of their water as all of the watercourses drain into the river, so they liaise closely with the EA. In the last couple of years there have been occasions where they have reacted using a very short term approach, it is not the established way.

It is very much a case of keeping an eye on the short term.

In terms of pumps, they have a very large mobile pump that they can use and have used to move water around, but they do have to be mindful of any negative effects it may have (e.g. they have a large summer storm, pump the water away and then go into a drought where the water would have been useful).

Systems and procedures have to be extremely flexible at the moment.

Working with others

Very reliant on the EA regarding main rivers. They need to work with all land users regarding water levels for the good of everyone. Land users includes farmers and anyone else occupying land within the drainage district. They do liaise closely with county council due to recent government policy change.

Expect that the county council will play a bigger part if everything is fleshed out from the Flood and Water Management Act

Have always dealt with water companies to a degree, as regards to abstraction points and monitoring boreholes and water levels, so there is not much else they can do.

They feel that other organisations such as Natural England should be a bit more mindful of what they advocate, NE have to understand that everyone has to work with the land and that it is not just the case of one approach suits all.

Current practice

Drought of 2011/12 was the best example of this. The drought happened in the winter and they would generally start to reduce the water levels towards the winter period. Due to weather predictions for that particular year they didn't lower water levels as they predicted what was happening (no operation of any infrastructure) and water levels were maintained which reduced the impact of the drought on that system. Romney Marshes pre-empted the lack of water by having long-term experience of how the district works; with an intimate knowledge of how your district works you develop an understanding of each watercourse and how it reacts to rainfall or the lack of. They were able to recognise that they were not

witnessing the flows in watercourses they would normally expect and they were not recharging as quickly as usual. With the obvious lack of rain Romney Marshes Drainage Board elected to hold fire on dropping levels any further.

Locally they deal with the EA and work in conjunction with them.

Meeting water needs

They can move water around and are very reliant on the sluices and stop structures. There is the possibility of moving water around and holding water within the system, but currently within their area farmers are starting to look into reservoirs as a way of helping themselves. The IDB can assist in terms of filling reservoirs and helping to fill out application forms for these farmers. The IDB must take into consideration if the reservoir is build close to an ordinary watercourse (unlicensed abstraction and obstruction of maintenance works). Abstraction licences are managed by the Environment Agency.

They do undertake water transfer within the system, there is one scheme currently that is very useful: there is a canal which is used as a drainage reservoir and is used within the summer months as a feed. As long as water conditions are ok the EA pump water into the canal from the main river, this allows the marsh to be fed by a series of sluices. The IDB ensure the flow of water is not inhibited. Nick Botting likened their adopted network of watercourses to an open-air plumbing system; they move water around by operating sluices and structures to achieve the best compromise to suit all stakeholders in the district. The maintenance of watercourses is essential to both conveyance and capacity of those watercourses.

They do move water in response to abstraction needs; they have to maintain that it's not to anyone's detriment.

Future roles for IDBs

They should try and encourage the use of personal reservoirs.

Cannot see where they could take on any additional roles and irrespective of weather patterns the traditional systems of responding is best.

They can be limited by legislation a bit, for example with planning applications. They are not statutory consultees, if the watercourse is not directly within their boundary they are not consulted until the end. At Romney Marsh it is not a huge problem because they have a good relationship with the council, but they do feel it may be a problem for other IDBs. Would prefer greater consultation regarding developments.

Other information

They don't use green energy, but they do try to reduce energy consumption by operation infrastructure to best design spec, if there are free flows gravity discharges that need increasing work done to keep open then that is done. They minimise their pumps effort by making sure that if the watercourse are not clear, they are cleared.

Weed growth is a common problem and they undertake maintenance of an annual weed cut by machine or by hand, 340 km cut on a yearly basis. If the water courses are maintained to a good standard they will be more resilient to the impacts of climate change.

1.5 North Levels

Paul Sharman

North Level, 33,000 hectare with all but 2,500 hectares totally reliant upon pumped drainage.

Impacts and assessing the risks of climate change

Impacts of climate change being wetter summers and more extreme weather events more often, for example a weather event that would occur every 50 years is now occurring every 20 years. Currently don't use any climate change projections, however they work closely with the met office in regards to current weather forecasting but have no desire to use climate change predictions i.e. they have chosen not to use them.

Plans and strategies for climate change

Continue normal operations which involve storing water in summer to maintain the water table, to facilitate irrigation and to enhance the wildlife environment, (potentially maintain water up to 1 m above Max Design Water levels). In dry winters they also store water at summer levels. If it suddenly becomes wet they decrease water levels by pumping. Don't have any particular plans or strategies to combat climate change, as we manage water levels depending on current conditions.

The whole catchment water level is controlled by pumps so water level management is as good as it can get.

Working with others

Work with:

- Met Office
- Environment Agency
- Local Authorities
- Local Lead Flood Authorities (Cambridgeshire, Lincolnshire and Peterborough City)
- District Councils
- NFU
- Fellow water management authorities

North Level has found the Environment Agency emergency teleconference calls very useful, particularly for the recent extreme weather events. The calls enable them to assess where there are problems that they can help mitigate the impacts/effects.

North Levels suggest that input from water supply companies, such as Anglian Water would help improve water management within the region.

Current practice

When there is too much water within the drainage district North Level increases pumping either by increasing the number of pumps pumping, or by increasing the time each pump is operating, this can therefore lead to extra costs either due to running past “economy 7” or just by having more pumps on at night.

When there is too little water the North Levels area can feed in freshwater for about a third of the area from rivers. The rest of the area relies on the IDB having stored water when it was plentiful. In this way the system is very restricted, when the water is used there is not much else you can do.

North Levels finds telemetry very useful when identifying when and where to take action to minimise flooding or retain water. They also find the Met Office forecasting very useful and they talk to local farmers regarding abstraction. They are currently undertaking hydraulic modelling which will be completed shortly after 2017.

Meeting water needs

Water transfer only occurs within around a third of the area and is mainly moved for abstraction. Within the last 10 years drainage channels have been widened, this allows them to hold more water for summer and also maintain water levels for the pumps in winter. This drainage widening was done because of development which was discharging into the board system. North Levels cannot increase the number of pumps in the area therefore they increased the capacity of the drains. Increasing drainage ditch size benefits the urban environment by having a greater capacity for run-off, but is detrimental to the rural environment as agricultural land is taken to widen ditches.

They can undertake water storage within the water channel, but only within their area, this practice usually involves using sluices.

Future roles for IDBs

Water transfer within the North Levels drainage district is limited by a restricted maintenance regime. Growth of weed restricts the water flow which therefore can't be pumped. Weeds cannot be cleared due to environmental protective measures, for example, breeding birds. In summer (June/July) if there is a sudden increase in water, excessive weed growth inhibits the movement of water through the channels and hinders the functioning of the pumps to function.

Suggested solutions to this problem include;

- Allowing the use of chemicals to control the growth of the weed but not disturbing the nesting birds,

- Cutting key lengths of weed from March onwards to keep growth to a minimum and completely deter birds from nesting there (this therefore has conservation implications) and;
- Cutting a third of the channel.

The chemical option is the more preferred option for North Level, however it was suggested that it can be met with some opposition.

1.6 Water Management Alliance

Phil Camamile

Impacts and assessing the risks of climate change

Main risk is increased storminess, which may increase rainfall intensity that existing pumping stations and drains are not designed for.

Rapid changes in water level can lead to bank collapse, exceed culvert design parameters increasing flood risk and decline water quality. Droughts can also adversely impact infrastructure by ground movement and restrict IDB capability in providing good quality water to support biodiversity obligations in environmentally protected areas or landowner ESA, HLS or ELS scheme areas.

Climate change predictions seem to be under review as there has been no increase in global temperatures since 1998, the IDB 20-year capital plan includes replacement of pumping stations and at each replacement a site-specific assessment is made of future needs, bearing in mind that a submersible pump life is only 25 years and can be upgraded, drains can be re-profiled to increase conveyance. Capital replacement programme follows Defra guidance on flood risk, administered through EA. Water availability for environmental enhancement (drought tolerance) is a black art and requires site specific consideration.

Plans and strategies for climate change

Plans for managing water levels are dependent upon the land use, either existing or future (e.g. HLS agreements). Many catchments have SSSIs and hence Water Level Management Plans which are being implemented (see below). Also landowners are developing water storage reservoirs on an ad hoc basis.

A holistic approach to water management is under development within East Suffolk IDB area (R. Deben) to investigate opportunities of strategically managing assets (bore holes (landowners & water companies), reservoirs, drains, rivers & floodplains) to give multiple benefits in floods and Droughts within the catchment.

Working with others

The IDBs work closely with Environment Agency, Broads Authority, Natural England, Norfolk & Suffolk Wildlife Trusts, landowners/ratepayers and many others (RSPB, NFU, Water Companies, etc.) to manage water levels, but this management is not necessarily related to

climate change but to seasonal requirements (high summer water levels, low winter water levels) and prevailing meteorological conditions.

As well as the above mentioned organisations, others such as Norfolk County Council as Lead Flood Risk Authority, District Councils and probably academic institutions such as UEA, Cranfield etc. will become increasingly involved, as will Rivers Trusts and other local site specific stakeholders and/or contributors to funding projects.

Current practice

The Halvergate Water Management Scheme was implemented in 2006 by the Broads IDB with 100% Defra grant. This is a continuous water management balancing act between arable (low water levels), grazing (higher water levels) and HLS breeding waders (highest water levels). Other WLMP schemes (e.g. Hickling, Potter Heigham, Calthorpe, East Ruston, etc.) involve management of pumps and control structures to move water where it is needed and away for where it is not.

All the Boards' pumping stations have telemetry, which is now being developed onto a web-based system to be read from any laptop. We receive regular flood warnings by e-mail from the EA, and we use the Met Office Flood Forecasting service. This helps to determine where likely problems may be - particularly surge tides which may bring the risk of overtopping or breaching. The IDB main role in flood events is in the recovery stages.

Meeting water needs

There are no IDB reservoirs as such, but maintaining higher levels in drains in summer periods helps in water storage.

Water is not moved directly as a result of abstraction needs, but some landowners have abstraction licences (with EA & NE consents) to take water from IDB drains and hence save on drainage pumping. The IDB cannot guarantee, however, that water will be available.

Future roles for IDBs

Managing water on a catchment basis, which includes IDB upland areas. This will allow us to control water levels draining to the Drainage District. Controlling the EAs low and medium consequence main river networks within the Drainage District and in the IDB upland areas.

Barriers: the Environment Agency's (EA) control freakery and drawn out legal procedures for extending the area of IDBs.

Barriers may be overcome by encouraging the EA to de-main low and medium consequence main rivers and by streamlining antiquated procedures for extending existing IDBs or creating new IDBs, as a means of climate change proofing the country.

1.7 RSPB

Jack Rhodes

Links between RSPB and IDBs in terms of current management of water levels

Quite a few RSPB reserves are within IDB areas and several are dependent on the water levels.

There has been a study recently on Beckingham marshes, which is a large reserve that the EA have created that the RSPB are going to be managing. The wet grassland hasn't appeared because the water levels have been too low in the IDB main drain that the RSPB take water from, so there has been quite a bit of work done there trying to work out a reasonable level of water to have in the drain; this is now starting to look good in terms of progress. Work has been done to look at what can be managed without increasing flood risk and where the thresholds should be.

The RSPB have talked to ADA in the past about some possible projects in the Fens or north Norfolk, looking at water trading around an IDB ditch network. The idea would be to create a storage wetland that could then release water back into the ditch network in dry summers and have the water abstracted elsewhere for a payment.

The RSPB are generally keen on multi-functional wetlands and reservoirs, and have created a number of reservoirs to supply their reserves during the summer if it gets dry. The largest ones of these is in their Otmoor reserve (this is not within a drainage district), the RSPB abstract when water levels are high in winter and then release water slowly over summer. The RSPB have been trying to work with farmers in various parts of the country including the Isle of Axholme drainage district (although not involving the IDB) to have the same sort of scheme put in place - with water taken in during high flows, stored in a wetland that has habitat benefits and then used for farmland irrigation over summer. There have been a number of problems, usually at the EA end rather than the IDB side in getting the scheme started and set up. Despite this the RSPB believe they could work with the IDBs quite successfully, but is something that is only slowly gearing up to happen. The problem in this particular case is that the catchment is closed to all new abstraction, despite being pumped drained. These pumped drained catchments seem a promising area for winter storage wetlands, and good opportunities to work with IDBs.

Tensions

Where wetlands and IDB networks overlap the RSPB tend to want water levels higher than farmers so it's a general negotiation around how high it can reasonably be and how to maintain sufficient water particularly in dry times of the year.

General conflict arises from the more agricultural side as this is the biggest use of the land and areas that are in question, the RSPB don't tend to come into conflict with urban areas, the RSPB has reserves that act as flood storage areas but those are generally quite constructive so there's not really a conflict there.

There is a lot of tension between IDBs and the RSPB, but in most cases it's managed fairly well, there are particular cases where the groups want different things, such as recently the RSPB have objected to the creation of a new IDB in south Cumbria because the measures proposed would have been damaging.

Practices IDBs should take up

Multi-functional reservoirs do seem a very promising area, and we would whole-heartedly support them in most areas.

On day-to-day maintenance, there are a number of practices the IDBs could take up. The drainage channel biodiversity manual does, in general, set out practices that can be done, however they aren't always selected appropriately, the actual implementation of them can be a bit sketchy, the RSPB would like to see more guidance around what's reasonable channel maintenance and what's not.

IDBs should continue practices such as holding summer water levels earlier to cover summer droughts, even though that has had adverse consequences last year (linked to summer flooding). The general flexibility has been welcome.

What's been done at Beckingham marshes could be a good example, through a bit of thought into what is actually problematic in water levels and what's reasonable to do.

There is a lot of good work going on at Somerset levels.

Thinking about blocks of land rather than individual fields, is something IDBs can really help with overtime and managing water levels across several farms.

A lot of practices are limited by abstraction licences that already exist and limit what IDBs and RSPB can do over summer; there will be systems that will be over abstracted.

Impacts of climate change

The impacts of climate change are going to differ substantially between different reserves, different bits of wetland will respond in different ways, especially as you go through temperature changes; changes of up to around 2°C will be manageable but anything over 2°C is less so.

Drying out over summer, flash flooding and flooding out of wader nests in spring, prolonged submersion on vegetation which damages the plants that support the whole ecosystem are all examples of climate change impacts. Coastally, sea level rising is going to be problem, there are a few reserves that are going to face saline intrusion if the ground water isn't managed in the right way. Early adaptation will be crucial.

Problems with climate change adaptation

There are a whole set of problems with adaptation, such as technical details like the problems the RSPB have been having with EA in getting winter abstraction licences. There are also really broad scale things such as species shifting; as species adapt and move they

can shift in to unprotected areas and our existing sites may no longer support them. Day to day arguments over water levels will come into it as well. The uncertainty as to what will happen makes everyone take a conservative position, protecting what they think might be a risk to them.

Evidence of IDBs adapting to climate change

I don't know many that are thinking long term, but I do know that some are becoming more flexible in the way they adapt, for example the drought we had up until last April or the floods last summer. They seem to be taking a fairly pragmatic approach in particular climatic events, rather than climate change as a whole. Things like building more capacity into the pumping system will be having that benefit. Not sure that many are thinking really long term, haven't seen any of them talking about what they plan to do over 20/30 years in response to climate change.

How the IDBs could help RSPB

Not entirely sure. Can see there is a big push behind more farm storage and reservoir capacity coming from the EA and to an extent government centrally, can see that opening up quite good opportunities to work together and also risks of us clashing.

There are risks around conservative management for flood risk and water logging, going back to throwing everything at draining land, but also opportunities around deciding that some areas should be used for flood storage and some areas should be wetted up to increase the resilience for other areas.

Additional roles for IDBs

There are always question around who actually has the time and resources for the sharing, but there are certainly useful skills that can be sent both ways, the RSPB do a fair amount of water engineering and water management themselves. IDBs tend to have a good knowledge of the broader network. Across their drainage districts the RSPB will be one part of the network and will be quite dependant on the broader network in some cases. There is useful sharing of skills between the more local management and on a district level (sometimes this works well, sometimes it doesn't). In biodiversity terms the RSPB work well with some IDBs and not with others, the skills the RSPB have are around wetland creation and management and similarly with both reservoirs and flood storage areas – in both cases, the RSPB manages substantial sites. We have useful skills and would be keen to be involved in more.

Other information

Storage reservoirs - the RSPB do have concerns about IDBs creating and managing simple farm storage reservoirs that benefit only the farms involved. This doesn't necessarily seem like the best use of public money, especially from the levy payers' side. So in terms of concerns around climate change adaptation the RSPB would be quite worried if tax payers money ended up being spent on large reservoirs used for abstraction, that aren't necessarily providing any goods beyond support to the specific farms. There should be an attempt to get as many benefits as possible out of schemes.

1.8 Natural England

Rob Cathcart

Natural England links with IDBs

10-15 years ago there was little collaboration between the two, IDBs were focussed on drainage issues with limited concern for biodiversity. More recently NE and IDBs have begun working together as IDBs have started to undertake delivery of environmental objectives, and increasingly see this as a key role of a modern flood risk management authority. The arrival of Jean Venables was a major contributor to this. An independent review of IDBs by Defra was completed in 2006, which also encouraged biodiversity enhancing activities by IDBs. Amalgamations of IDBs also helped as the large consortiums and groups of IDBs made the organisations more able to manage water and allowed them to become more involved in a range of activities, including environmental biodiversity. Up to 2010 the Government's Public Service Agreement target to get 95% of SSSIs in 'favourable' or 'recovering favourable' condition was in place. This encouraged NE to work with IDBs to meet this target as their catchment areas often included designated areas. The larger IDBs and groups of IDBs tend to be those which are most involved with NE, smaller ones tend to be more focused on the specific drainage requirements of their ratepayers. ADA and NE produced 'The Drainage Channel Biodiversity Manual' in 2008 which encouraged best practice in IDBs. ADA and Defra agreed that IDBs need to have Biodiversity Action Plans (BAP) in place for their catchment, they released a biodiversity action plan template. This is covered by the NERC act. BAPs are voluntary, however the larger groups of IDBs, in particular, have set targets and are trying to deliver against them. BAPs rely on Defra's encouragement and IDB willingness to be effective. Ideally IDBs would work towards biodiversity targets, such as habitat and restoration targets, especially with the development of the Biodiversity 2020 targets. NE will lobby for a new outcome measure to reflect these ambitions when Defra revised the current outcome measures (2015).

Risks associated with climate change

Integrated land and water management on a catchment scale requires the IDBs to play a part and share objectives with NE. Climate change will lead to increased management of water (both surplus and drought) and the IDBs will be important in this process. There needs to be sharing of objectives to help ensure that balanced demands are placed on the land and water environment. IDBs need to play a full part of Catchment-Based delivery. IDBs manage water levels in 10% of England. IDBs are an important link between water management and land owners and are at the interface between land and water management.

Skills, expertise and roles of IDBs which are needed/lacking

NE interest in IDBs is focused on their skills associated with management of water levels, e.g. at Woodwalton Fen (Middle Level Commissioners), here there is a complex hydrology which must be balanced between biodiversity and water abstraction. Also affects the wider area as wetland systems link landscapes.

NE is also interested in the roles that IDBs could play outside designated sites. They manage thousands of kms of channels and their ability to manage these areas at a landscape scale is important in terms of apportioning water for the future. For example, the IDBs in the Fens could increase storage capacity in order to move water around based on varying needs and across what is a large area. With some forethought there could be real opportunities put into place to bring significant biodiversity benefits.

Changes in flood management requirements lead to the need for changes in water levels. The costs versus benefits in Fenland for drainage make continuing the current processes not feasible for the future. The economic case for investment in large infrastructure no longer stacks up. Somerset Levels suffered severe flooding in the past two years and there has been lots of focus on it, Defra is very interested in how to improve the management of water levels there. This includes consideration of what a sustainable future might look like. There is a key question for Defra on how they are currently spending their money, and how this could be spent more efficiently. The balance between sea level rise and farming (especially arable farming) will be an important determinant of future activities of IDBs. It is likely that the activities of IDBs will be significantly different in the future 20, 50 or 80 years from the present.

1.9 Regional Flood and Coastal Committee

Steve Wheatley

The EA and RFCCs already work fairly closely with IDBs on water management. For example, in periods of drought (as in the early part of 2012) IDBs in the East Anglian Fens keep water levels in their drainage channels higher than normal winter levels rather than discharging or pumping water into the Main River system, thereby storing as much water as possible. The IDBs also work closely with the EA to manage water abstraction from their drainage channels. This currently works very well, so there has been no identified need to work any more closely than we do now.

The EA and the RFCCs are hoping to be able to delegate more work to IDBs in the future, pending the resolution of any EU Procurement rules. In the Anglian Central Area we are working with an IDB on the possibility of them taking over the management of 3 Main Rivers once these rivers have been de-mained by the EA.