

1 **INTERVIEW TRANSCRIPT**

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5 *(First questions are based on the online survey we sent to UKIA members in*
6 *December 2014)*

7 ***Interviewers (I)***

8 *Grower (G)*

9 -----

10 **I: If you can start giving us a brief description of your farming business, the**
11 **crops that you grow...**

12 G: It is all very light sand. It can be all irrigated. Our crops, in order of economic
13 importance: onions, potatoes, carrots and parsnips, asparagus, sugar beet, cereals.

14 We rent land out for various other things. I do pigs, we rent land out for maize, for
15 anaerobic digesters.

16 In terms of area, potatoes is our biggest area and onions is our second, but in
17 economic terms is the other way around. We also rent several hundred acres a year
18 from our neighbours for growing potatoes and onions with a few acres of carrots.

19 **I: What was the proportion of land that was irrigated last year?**

20 G: 100%

21 **I: Which crops are rainfed and irrigated and the average yields?**

22 G: Maincrop potatoes are all irrigated, 25 t/acres. Vegetables, carrot and parsnips,
23 all irrigated. The yield depends on the year. Carrots you are looking at 40 t/acre and
24 parsnips 20t/acre. Cereals, we try every year to irrigate them, at a greater or lesser
25 extent, they are not fully irrigated in the same way as the other crops are. Rainfed it
26 will be 1.5 t/acre and 2.5 t/acre with irrigation. Likewise, rainfed crop of sugar beet, it
27 will be 15-20 t/acre and 25-30 t/acre irrigated.

28 **I: Just to clarify, you irrigate all your sugar beet, right?**

29 G: To a greater or lesser extent. With cereals and sugar beet in between everything
30 else. We are very fortunate in this farm, we have plenty of capacity and plenty of
31 water.

32 **I: What about the water sources that do you get the water from?**

33 G: 100% groundwater

34 **I: What type of abstraction licences do you have?**

35 G: Summer-only abstraction licences (4 in total)

36 **I: What irrigation methods do you use? Which are the percentages?**

37 G: Hose reels (sometimes rain guns, sometimes booms) 55%, central pivots 45%

38 **I: How do you decide when and how much to irrigate? We have here different**
39 **options**

40 G: The potatoes is a 100% of water balance. In-field soil moisture measurement is
41 used as backup for potatoes, and I put 100% for onions on that one, also carrots
42 and parsnips. Judgement for all other crops.

43 **I: What is the final destination of your products?**

44 G: Maincrop potatoes and cereals for processing. For cereals, I put malting barley. It
45 is local, but is not farmers' market, it is national. Sugar beet, it is for bury, factory for
46 sugar.

47 **I: We are going to start talking about droughts. You have here the different**
48 **past drought events, if you could tell me the level of impact**

49 G: 1976, I am going to cut that off because we weren't here at that time.

50 It was a long time ago...It was a lot of extremely hard work, because those were the
51 days we didn't have rain guns, all was sprinklers and hand-made sprinklers. It was a
52 long hot summer, we didn't get 2 inches of rain [...] and then everything went
53 flooded.

54 I am going to say that on this farm, the [halo?] is somewhere between no impact
55 and low impact in terms of economics. So basically the bottom line didn't suffer
56 much of anything.

57 **I: The interesting thing is that the way you have described it seems that you**
58 **have plenty of capacity, plenty of water, give the impression that you have a**
59 **lot for resilience whereas the farmer we visited before made the shift from**
60 **rained to irrigated so he described to have high impacts for the early**
61 **droughts so after they put that infrastructure the impacts went down. So the**
62 **way you are describing it seems very constant and consistent.**

63 G: We moved in here in 1999 we inherited a full irrigation system with the amount of
64 water that we have at the moment. And we have always had plenty of water for the
65 area that we have here. It is all groundwater, so we are not affected as much as
66 people who has surface water, who irrigate just in the summer time out of rivers
67 basically. Our river down here is a supportive river, which means that if the water
68 level gets low, the EA has boreholes to turn on and fill the river up. So likely the
69 people who irrigate out of this river, surface water, also don't suffer very much from
70 drought problems because there is a backup system. Of course they pay
71 handsomely, it doesn't come for free, there is a cost involved in it. But this is by no
72 means what happens everywhere, it is an exception rather than the rule.

73 Until now, borehole abstractors in general have not been affected by legislation by
74 droughts and whatever, to the same extent as surface water people have. That
75 potentially is changing but we probably get into that in a little while.

76 Until now, to seriously affect groundwater people, the agency would have to prove
77 that there is a connection between the groundwater, the river water and the ecology
78 in the river. And they have been reluctant to do, and that is why the impact on
79 groundwater has been less. We have very resilient groundwater here, there is a lot
80 of water in the chalk. Although there is a connection between the groundwater and
81 the water in the river, it is fairly resilient.

82 **I: What could be the yield reduction for the most important crops you are**
83 **growing during the last drought episode?**

84 G: The most recent drought period was this that you are mention here, 2010-2012.
85 In spring 2012 we (this farm and other boreholes abstractors in this area) were
86 asked to ensure that our abstraction in 2012 was basically no more than it has been
87 in previous years, so we didn't over-abtract because the Agency was afraid that
88 half way through the season, in June, or July or August that year, if we do too much
89 abstraction it would lead to unsustainable low levels in the river and they would be
90 forced to turn our pumps off.

91 The net result of that was that we did agree to make sure that our abstraction in
92 2012 was no more than in the previous year or two, and we did make provision in
93 that year for basically not irrigating low value crops, like cereals and sugar beet, and
94 to ensure that we had more than enough water for high value crops. But then it
95 rained and all that went out of the window very easily. So that was what happened
96 in 2012.

97 In a way, that is what happens in every drought. Because we are groundwater, you
98 get reasonable notice. If you get 2 dry winters together, you know that the
99 groundwater is gonna be low. If you get 1 dry winter you always looking out for
100 number 2 just to see what happens, and it starts dry and continues dry, you know
101 you are going to be in trouble, well potatoes are gonna be in trouble. So there is
102 always that notice period that you get. You do know

103 **I: So you can see the drought coming?**

104 G: Yes, you can.

105 **I: So in 2012 that strategy didn't lead to any change in your planting areas for**
106 **example?**

107 G: No, because of the resilience we spoke about. We have enough, so we can
108 move it from low value to high value and still have enough. The problem comes, or
109 potentially what happens is if you get to the middle of July and you have to stop, no
110 matter how much water you saved, you are not going able to use it. But we have
111 never been in that position.

112

113 **I: What happened in 1990 when the WAG...what was happening here?**

114 G: I can't remember it being a huge problem to us, let's put it like that. We had lots
115 of different problems at that time, but it wasn't directly that. About 5km away, there
116 is a site of huge importance. In 1990 the Agency started making noises about the
117 effect of abstractions on the meadows. It is a fluctuating water body, so naturally the
118 water level goes up and down. They were concerned that the amount of agricultural
119 abstraction in the area (about a half dozen boreholes in the area) was affecting the
120 meadows, and the Agency (what did they do?)...they refused a licence for the
121 borehole that was closest to the meadows. There was a subsequent public enquire
122 which the abstractor lost. The net result of this whole discussion was that the
123 boreholes that were closets to the meadows (3 or 4 of them) were effectively shut
124 down and the farmers affected got together and did a collaborative scheme for
125 putting in reservoirs and share the link supply. So there was a substitution of winter
126 fill in reservoirs for borehole abstraction.

127 As we were right in the edge of the area, we spent a considerable amount of time
128 and effort suggesting to the Agency that the way they calculated what were the
129 effects on the meadows was in fact wrong. I think our view was accepted to a
130 certain extent, but that acceptance plus the fact that the ones that were doing all the
131 most damage were taking away, meant that we were able to keep our boreholes
132 and we didn't have to join the scheme although we could have done. It was open to
133 us, but we declined.

134 The nearest reservoir is in the farm next door, so we could in effect tap into if we
135 wanted to, at a cost obviously, but that is an effect on boreholes which in a way is
136 caused by droughts but it is not direct in a way. But the effect is the same, the full
137 process that went into that is exactly the same process that this farm have to go
138 into, and any other farm go into if you are facing the same problems.

139 **I: That is more in the water scarcity area rather than the drought itself...**

140 G: Water scarcity is wherever there is drought, and the other way around. One
141 becomes the other. It is a risk to your business. What are you gonna do about it?
142 Are you going to accept it? And say, ok, I know 2 years out of 10 I am going to have
143 problems and I am going to get over it. If you are not going to accept the risk, you
144 have to do something about it, you put a reservoir or you do any other thing. But
145 those two things are effectively the same, they are a risk to your business.

146 **I: Do you have reservoirs?**

147 G: No, we are direct pumping. I will come to that in a minute. Maybe we will be
148 forced to have reservoirs because of new threats, new risks for the business.

149 **I: The experience that you have with the meadows and the abstractors nearby,
150 has that now gone quiet and the EA are happy with the actions they took, or
151 do you think it is still bubbling away?**

152 G: We haven't heard about it since. The cynic says it has solved the problems
153 because if they said they haven't solved the problems, they did very good all over

154 the places. So effectively we'll say to them that what they did in the first place what
155 entirely wrong, but it wouldn't go down very well, would it?

156 **I: Unless they thought that the meadows wasn't recovering enough in which**
157 **case they would expand...**

158 G: Yes, I suppose they could say that. But this is the situation, this is what we have
159 done, it is quite difficult for the authority to go against that and say: sorry chaps, we
160 were wrong...

161 **I: Are there other risks to your abstraction points or you seem to be just in a**
162 **safe zone in terms of environmental/ecological links?**

163 G: There are more water-based SSSI and SSC that there are in any other county in
164 the country and I am not sure there might be more in Norfolk than in everywhere
165 else in the country put together...But there are a lot of them in Norfolk.

166 At the moment we are OK, but if somebody decides that the SSSI is not performing
167 as it should do, and all of the sudden the zone of influence increases, then you
168 suddenly...you were previously outside and now you find you are affected, or for
169 example we have got a [country wildlife site?] which is the lowest level of protection
170 of any environmental site. And at the moment the site is fine, but if somebody
171 decides to change the status quo, then all of the sudden you have a problem. You
172 are always looking out for it, but at the moment...

173 You should keep an eye on the ball and make sure you know what is going on in the
174 area. And sometimes you can do anything about it, and sometimes you can't.

175 **I: Now let's talk about drought impacts on prices. Did you experience any**
176 **impact on prices in previous drought events?**

177 G: All our potatoes are on contract, so they have a fix price. So in terms of drought,
178 it doesn't have any impact on that. But having said that, if you are lucky and you
179 have a surplus at the end, then you would get more for those that you would no
180 normally. But in general, the effect is minimum.

181 Vegetables, I would say it is a moderate increase (for onions). And the way it works
182 is this: If you supply supermarkets, you never get the very highest prices but you
183 never get the very lowest prices. So when there is a collapse you will do
184 considerably well compare to the open market. But when there is a shortage, you
185 won't get the very highest prices, but they will increase a little bit. So they try to keep
186 it as levelled as possible across the years, so give one and you take in other year.
187 But the effect is actually quite small.

188 Cereals, they are totally dictated by the international market.

189 Sugar beet, no effect because it is on contract. The same for carrots and parsnips.
190 Contract growing it is all down to quantity, because the price is gonna be fixed, so
191 you are gonna try to meet the tonnes that you have in your contract. And this is
192 what all this is about. It is about risk mitigation.

193 **I: The reason that you choose to go 100% forward contracts, is that just to**
194 **reduce risk in the business?**

195 G: It is two things. It is that, and also the soil here is very [sharp?] sand so it is not at
196 all good to produce pre-packed for supermarkets. And therefore that really dictates
197 that you go down the processing line, and that you go for contracts.

198 But it is also risk mitigation. We have a lot of risk in terms of onion crops, and you
199 don't want to increase the risk doing the same thing for potatoes.

200 **I: Did you experience any problems with these contracts during drought**
201 **periods, in terms of not achieving the right quality, yield?**

202 G: In essence, no because as we have plenty of irrigation, we don't have any
203 problem with not irrigating properly. It is only if you don't have enough irrigation then
204 you have problems.

205 Interestingly, 2012 was the worst potatoes supply year that we had for a long time,
206 and it was not a year of drought, it was a year of surplus water. It was a year of
207 flood and not drought, too much water. So it is both the extreme of too dry or too
208 wet that always give you problems. So the effect is the same but for different
209 reasons.

210 **I: Do you think that the problems of having too much water are worse than of**
211 **those caused by not having enough?**

212 G: I don't know if you could say they are worse...They are different but the effect
213 can be the same. Our customers, the processors, they spend millions and millions
214 and millions of quid buying potatoes from the continent that we couldn't supply. So it
215 costs them a huge amount of money.

216 **I: That excess of water, was that a problem with the crop yield or with the**
217 **difficulty of getting it out of the ground?**

218 G: Both. Effectively it is the yield of the crop. Everything just sits in water all the
219 time, nothing grows properly, they roots all die. Then you get a dry weather and
220 everything dies because it can't get water because all the roots are gone. And
221 particularly on heavier lands, these are terrible.

222 With this land the water gets away better because it drains through it. So you don't
223 get those problems. If we know we have a hot weather after a wet period like that
224 you know you can modify those effects. They cannot do that on heavy land, they
225 cannot get the machines on to [...] control or anything. You have the same effect
226 from a completely different thing.

227 **I: Now we are going to talk about abstraction restrictions. Here you have the**
228 **different drought periods and if you can remember if you have any**
229 **restrictions (voluntary, mandatory)?**

230 G: This one (1988-1992) was mandatory as we have talked about. I don't remember
231 we have anything in 2003 or 2004-2006. When you back to this sort of area, the EA

232 have moved from a position of dictate, which is the one you have here (1988-1992
233 and 1995-1997) to now when you have discussion and consensus.

234 I cannot remember whether we had any restrictions (1995-1997)...it certainly
235 wouldn't have been voluntary, that is for sure. If any, it would have been mandatory.

236 **I: That would be really nice because the National Agency drought team**
237 **doesn't know what restrictions were placed anywhere. They sent me**
238 **everything they have... At a national level they don't have these records. Now,**
239 **what sources of information do you normally use when there is a drought?**

240 G: You know is coming...Personally, I am heavily involved with the NFU, so that is
241 my personal source of information. Apart from what you instinctively know, they are
242 the people that now the Agency goes to and says: look guys, this graph is going
243 down and it should be going up. We are gonna have a problem, you get out there
244 and tell your members that we should start putting our flags up. And that is
245 essentially what happens now. And then your WAG, they get this information and
246 put it out to their people. They instinctively know already, but it just flags up to
247 them...think about it, what are you gonna do? Start talking to your WAG, what are
248 you thinking? And then the WAG will send that back to the NFU and then to the EA.
249 So you get this two-way dialogue going.

250 **I: We have here a list of strategies that you could apply when there is a**
251 **drought. Could you tell us which ones do you normally apply and which are**
252 **the most important to your business?**

253 **If you in are in that sort of getting towards 2 dry winters, you are looking**
254 **ahead, you think that the EA is likely to be asking for voluntary or perhaps**
255 **mandatory restrictions, what are the type of responses that you would apply**
256 **to, for instance, keeping voluntary and not going mandatory?**

257 G: There is a diversity of opinion within the farming community as to whether one
258 should pay any attention at any exhortation of the Agency to have voluntary
259 restrictions. Some people would say no, this is entirely one way you know? We give,
260 they take and nothing else happens. I think personally it is a bit unfair, but I can see
261 where they are coming from. It has to be a dialogue.

262 The Agency is a regulatory board, they exist within different regulations, some of
263 them are us, some of them are EU...so they have to exist within these walls and
264 they cannot voluntarily go outside that...They can't give too much. So I can
265 understand that there is a feeling that there is all [...] on the part of the EA and all
266 give in behalf of... but I think this is slightly unfair.

267 But having said that, to ask to the question here, you cut down the irrigation of the
268 least valuable crops you have. That is the first thing you do. That applies to us, but
269 what happens if you only irrigate high value crops? Which applies to most people,
270 not all people, but most people. What is your attitude to risk? That is the first thing.

271 In 2012 we made a decision, we will transfer to high value crops, we will still plant
272 exactly the same area of high value crops because we knew we can serve that. You

273 have a complete different story from other farmers, because they haven't got water,
274 I am not likely to get water so I cannot risk putting crops in that I potentially will not
275 be able to irrigate. So different situation, different water supplies, different answers.
276 But he is only irrigating to a certain extent high value crops and he has a different
277 water source to us. So he just couldn't get water out to the river, nothing in his
278 reservoir or low levels...far too much risk to his business, so that is why he decided
279 to cut this risk out.

280 We are in a better water resources position, so we can accept a little bit more risk to
281 our business, plus the fact that we can move water from low to high value crops. But
282 essentially the whole process is the same, the same thought process is going
283 through the whole thing.

284 What would happen if you got 50% or 25%? There is no way we can irrigate all our
285 high value crops with the amount of water they are going to allow us. What are we
286 going to do? Someone was telling us the other day that our irrigation systems are
287 design to the 80% probability of exceedance, so 80 out of 100 your system will
288 be...so basically you go down to 80% effectively with whatever water you got. If you
289 have got enough to irrigate 100 acres...If you got a certain amount of water, you go
290 down to the 80%, that is your 80%, isn't it? You accept that in some years you are
291 going to be short and in others you are going to be long. So if you got a reduce
292 amount of water, you reduce your area to take that into account. In my view, you
293 cannot plan exactly the same area and hope that is going to rain or whatever and
294 you get the full crop. There is far too much economic risk attached to that
295 scenario...and I would say that 100% of people wouldn't agree with that scenario.
296 You have got to reduce the economic risk to your business.

297 **I: When you are supplying, let's say, potatoes for processing and therefor the**
298 **quality threshold isn't as high as for supermarkets, would you still do that**
299 **strategy for your vegs or reducing the area but keeping the full irrigating**
300 **amount rather than keeping the area and irrigating a bit less?**

301 G: This is a very interesting point because although you have less demanding
302 criteria for processing crops than you do for supermarket crops, you still have
303 criteria to which you have to agree. One of them is normally that you have to have a
304 certain number of tubers per 10kgs of crop. If you have a whole lot of small ones, so
305 all of the sudden your product is way out of scale, they might say to you: sorry, we
306 can't process it. There is too much cost attached to us as a processing business to
307 deal with it. Because the smaller the potato is, the more waste you get, or you
308 cannot make the chips long enough. If all the potatoes are that long, they have a
309 problem. Having said that, if things are really sort, they will take anything because
310 they have to. Perhaps not go as far along the course that I suggested with
311 processing potatoes as you would do with supermarket stuff. I can understand the
312 reason for your comment. So you have to weight that up as part of your decision
313 process to say, can I get away with having more acres of [...] crop? And I would
314 guess most people would be towards having [zero?] acres of bigger crop because
315 you still have a planting, you still have a harvest, ... You have a bigger crop of a
316 smaller number of acres and it is important to get. And normally this is the best way

317 to do it. If you could forecast that it is going to rain at the right time, you plan as
318 many acres as you could.

319 **I: What about negotiation with the EA? Is there any possibility?**

320 G: Relations with the Agency have improved immeasurably over the last 15-20
321 years. They are much more ready to talk to abstractors, to discuss the problems, to
322 try to reach solutions that enable them to fulfil the regulatory rules plus give as much
323 flexibility to the abstractors as possible. Because that is what abstractors want, they
324 want flexibility.

325 For example, not all crops are treated equal, not all the needs of abstractors are
326 treated equal. So some have abstraction regimes that are towards the beginning of
327 the season, and other ones will have abstractions regimes towards the end of the
328 season. Now, the guy who has got abstraction towards the end of the season wants
329 to be treated as fairly as the bloke who is on the front. So from his point of view, he
330 wants to say: if I don't abstract at the beginning of the season, I want you to
331 guarantee me water at the end of the season. Although guarantee is a difficult word
332 but...So this is the kind of flexibility that people want in agriculture as a whole,
333 because not all the people is treated equal or the same. So the Agency has got
334 much better discussion, they have got much better coming up with innovative
335 solutions to problems. And we heard about this just at the end of last year.

336 We were told then that, this is entirely surface water catchment, there have always
337 been problems with water levels, and the way the Agency has to manage water
338 levels and the abstractors have to manage water levels, etc. With a different
339 approach by the Agency in collaboration with abstractors, this problem has
340 disappeared. So it is exactly the same amount of water, but managed in a different
341 way. Effectively that is what they said. So different way of manage it, the same
342 amount of water and the problem disappears. We are encouraging the Agency to do
343 that.

344 But in my cynical [...], it took them (abstractors) years to come up or to accept what
345 they what being told by the abstractors. You did this way...

346 **I: They had a method that they always use and they were not prepared to**
347 **change it. I don't remember what the trigger was...It was some local fellow**
348 **that was in the Agency that said: why don't you just try this? It has to do with**
349 **intervention as they saw the levels dropping rather than acting straight away,**
350 **waiting a little bit and then see if there is a little bit of recovery and try it the**
351 **following year...and it didn't have any impact on ecology...**

352 G: Yes, so everybody is happy

353 **I: It was just too prescriptive...**

354 **But this is something that we were chatting before in the car, about**
355 **thresholds for S57 restrictions are all written down and based on flow**
356 **exceedance. If it goes to Q98 you do this. But then it says...and if you think**
357 **that it would be rainfall...so it goes from being very rule-based to actually**

358 **having an interpretation, an expert judgement process. The fact that we are**
359 **coming across this EA staff member so frequently makes me wonder how**
360 **different things would be if you have a new person that haven't been around,**
361 **haven't this history in his head...so how much is the individual and how much**
362 **is the organization?**

363 G: Very often the individuals within the Agency agree with what the farming
364 community says, but they are hampered by what they have been told by people
365 upstairs. So they will like to do these things (that is the impression we get) but they
366 are not able to do them, they haven't got the authority to do that.

367 So you have to keep this process and try to talk to the right people, try to influence
368 them so you get the outcome that they are happy with and you are happy with. And
369 it is happening. Sometimes it is slow, but it is happening.

370 **I: I think it is like the planning regulation, you sort of get the [...] and then you**
371 **just keep working and get: yes but...Something that works for both parties**
372 **but the EA in water resource regulation has been so constrained that they**
373 **didn't have the chance to put the boundaries a little bit.**

374 G: They have got much better forecasting problems, telling people about problems,
375 allowing agricultural people to make decisions. And not just saying: oh, sorry chaps
376 that the water levels are going down so you have to stop. Thank goodness those
377 days are gone.

378 **I: Do you think that statement about the Agency is a general one, or it is just**
379 **applied to this office? If we ask people in other areas, will they be saying**
380 **the same things about the Agency?**

381 G: I think we tend to be more positive in this area because we have a long history
382 going back 20+ years in talking to the Agency, dealing with the Agency officers in
383 the area. My feeling is the other Agency officers are slightly where our Agency
384 officers were 20 years ago...So if there is a problem [...] rather than dealing with it.
385 But this is my opinion...

386 **I: I think it is probably because at this time of the year every year the Agency**
387 **is thinking...OK, what is this year gonna look like? What are the prospects for**
388 **abstraction? Maybe in other parts of the country it is not in their minds until it**
389 **emerges, it pops up...**

390 G: Yes, there is always something more important to do, which is fine you know?
391 That is life, it is what everybody does...

392 **I: So they think that was the story with water levels, abstractors? Because it is**
393 **dominant...**

394 G: Basically they know that if they don't do that, their lives are gonna be hell in a few
395 month time. It makes their lives easier, so why don't do it? Considerably easier...

396 **I: After the last drought episode, did you do any change in the business in**
397 **order to be prepared for future droughts?**

398 G: The answer is no.

399 **I: In your opinion, what are the management aspects that should be changed**
400 **in order to improve drought management in the UK?**

401 G: As far I can see there is effectively one solution, you have to have more water
402 storage.

403 I always got in the back of my mind that we need to have 2 or 3 things: we need to
404 have the maximum amount of infiltration into the soil, and how do you achieve that?
405 Because that basically stays-off drought. Because drought is effectively: a) there is
406 no water, and b) it is the effect on ecology in the water courses. So, can you make
407 the water courses more resilient to low water levels? And we will be helping flood
408 management.

409 It is all about morphology of your river system. If you can imagine, on the one hand
410 your river is like a canal. It goes straight like that. The resilience of that is basically
411 nil. If you have the same river that does this (not like a canal), carrying the same
412 amount of water, the resilience of that is hugely greater. You can have no water
413 going down it but you have pools and you have places where the fish survives and
414 the snail survives, without going completely dry. So the resilience is much greater.
415 Now, can we build more resilience into our land management and river
416 management that allow us to do those things? Flood management, ecological
417 resilience and water infiltration. That is something that we have just scratched the
418 surface off to be honest. I don't know how much percentage of [fed?] you could
419 have with that, but if you get 5% out of it might be worth having it.

420 When people talk about flooding, people say you have to do this, you have to do
421 that. Well, what is water infiltration but holding water back? So you are talking the
422 sort of the same language for a different purpose, but the language is quite similar
423 strangely. But the Agency is involved cause they have a sort of overall people, you
424 have got whoever looks after your local river and you have the land owners, all of
425 them going in the same direction because all them want good ecology. How do you
426 achieve that and the tools you use to achieve that?

427 **I: Cranfield University has a special interest in this as we have the River**
428 **Restoration Center.**

429 G: So you know exactly what I mean...

430 **I: You haven't mentioned water trading as an option for this given that, you**
431 **know, when you take the catchment, the abstractors vs. the licence amount,**
432 **the headroom...you don't see water trading as a solution?**

433 G: No, because during a drought nobody got anything to trade. You have to have
434 something to trade.

435 **I: But at the catchment level, would it be correct then to say that every farmer**
436 **abstract 100% of their licence?**

437 G: No, but you can't trade anything you haven't use, you can't trade headroom. And
438 if, for example, we as borehole abstractors, if we were under restrictions
439 presumably our neighbours got exactly same restrictions. So unless he is not
440 growing any crop, he has got nothing to trade us. The only way I would have
441 something to trade to him, for example, if I have a reservoir or physically some
442 water I can give to him. So trading comes out from having something to trade, and
443 by large in the end it is water sitting in the reservoir.

444 **I: So have you not had any spare capacity in some of these drought years**
445 **that your neighbours said: hey, I can trade some water with you or...?**

446 G: No, we never had it...If it is a drought situation, presumably we are under
447 restrictions, otherwise it wouldn't be a drought. And we are restricted the amount of
448 water that we personally got so if we grow any sort of crop we go nothing to give our
449 neighbour next door. He would have to not be growing anything to give us
450 something.

451 **I: We were thinking in 2011, from what you said, there were no voluntary or**
452 **mandatory restrictions on your abstraction, and it was recognized as a**
453 **drought year. Even in a year like that when there were no restrictions on you,**
454 **you still don't have spare capacity to trade or it is just that everybody have**
455 **enough...**

456 G: Everybody had enough. In this area the answer to that is yes. If you go to the
457 Middle Level, where the system is completely common system, then effectively the
458 water is stored in a big reservoir, and everybody take the water from that reservoir.
459 So, in that case, you have got a common resource, a common channel, and there is
460 much more scope for trading in that situation that in our situation. Everything is
461 common, and common equals easier.

462 In a drought, you cannot trade yourself out of the problem unless someone has
463 actually something to give you. My neighbour has a reservoir up there. If we are in a
464 drought and his reservoir is full and he hasn't used it, he has something to give me.
465 But he has to have it there.

466 **I: What is your medium term view in terms of drought risk? You talked earlier**
467 **about potentially investing in storage. Have you thought about it in the last**
468 **10-15 years?**

469 G: We have been thinking about it every day for the last 20-30 years. Ever since we
470 had the problem with the meadows, it is on number 1 water resource issue, whether
471 we should invest in a reservoir.

472 In the early days, I did talk to my neighbour because we don't have direct access to
473 the river so we have to go through our neighbour's land to do it. At that time, we
474 couldn't reach any sort of sensible agreement to do that. So we thought about it,
475 about the possibility of having a join scheme, but that just didn't happen.

476 Yes, we could have a reservoir that we fill in with groundwater. How many years out
477 of 20 will I use it? Suppose I will use it probably 1 year out of 20, so I will have a

478 quarter million pounds reservoir sitting there for 20 years and I only use it once. It is
479 effectively a very very expensive insurance policy. So you have to ask yourself, is it
480 worth doing? What is the risk? You are assessing the risk of using it against the cost
481 of having something sitting there. And this is the question we ask ourselves every
482 single day. What is the risk to our business under that scenario? And the way we
483 answer that until now is that we have plenty of headroom, and we can see it too
484 much going forward and therefore we have not invested in a reservoir.

485 Now with the WFD we have a completely different scenario. We have the possibility
486 that we will not have headroom in our licences, at all. So the risk to our business is
487 completely different now than it was yesterday. We are trying to assess how it is
488 going to end up with WFD. Hopefully it would end up better, but it could end up
489 worse. There is a possibility it might end up worse. So you are trying to think about
490 what the end point is, and therefore what is the risk to water resources and for
491 economics in your business is. And that is where we are with WFD. We are in the
492 middle of that assessment of the water resources and economic risks to our
493 business. And when we reach the conclusion on that, we will be better able to
494 decide whether we need a reservoir.

495 Anybody in this situation (boreholes and WFD) is thinking exactly the same. Other
496 farmers, with majority of surface water, have different risk profile because of the
497 different water source. So their assessment, although we are talking about the same
498 thing, is different to mine.

499 **I: His has been more gradual, hasn't it? Because he has a mix of water**
500 **sources that one become has been increasingly less reliable, he invested in**
501 **two reservoirs; whereas you for 20 years+ have been relatively unaffected by**
502 **droughts and the groundwater has been secured, but now you have a new**
503 **externality. It is a hard one because you can be lucky for 20 years or it can**
504 **change dramatically...**

505 G: Did he say that he is actually putting more reservoir capacity that he needs for
506 one year?

507 **I: yes, he said 120.**

508 G: So effectively he has a 20% increase insurance policy into his business, doesn't
509 he?

510 **I: In a way, it is worse if you are more secured then, in terms of your risk...it is**
511 **an interesting dilemma because it is a much bigger risk for you to invest**
512 **whereas other that have supply less secured...**

513 G: They have no alternative

514 **I: It make sense because maybe 1 in 10 or 1 in 5 they would need it, but for**
515 **you it could be 1 in 20...**

516 G: Yes, the difference between him and us is that we are all groundwater...

517 **I: On a scale from 0 to 10 how do you think drought is important to your**
518 **business?**

519 G: Until now, the economic risk to our farm business hasn't been huge, so I will put
520 it down here (2), but we couldn't farm without water, we wouldn't be here...That is
521 another way of looking at the same question

522 **I: Do you think droughts and water scarcity will be more frequent in the future**
523 **in the UK?**

524 G: Certainly in the long term the answer is highly likely. If you go on the principle
525 that today's dry year will be tomorrow average dry year, which is what climate
526 scientists are telling us. So you have to say that is going to get worse