

Episode 36

How to Save Water in Your Home

The show notes: www.houseplanninghelp.com/36

Intro: Cath Hassell is from ech2o consultants. She's not only extremely knowledgeable about water but you can hear it's also her passion. So my first question was about how she became interested in this area.

Cath: Well I was a plumber on site for a lot of years, fell into plumbing completely by chance but once I started doing plumbing I was like: "Whoa, this is so interesting." Then I just got really, really into it and when I was first on site I loved uPVC pipe. That is the best pipe used for waste pipe, which environmentally is really, really bad.

We used to put in dual flush toilets – this was back in the 80s – and we'd never really put the sign up. Then we'd have discussions in pubs about: "Well, yeah, what's the point in putting the sign on to use it, everybody rips the sign off!"

Then a friend of mine, she went up to C.A.T. - Centre for Alternative Technology – and she sent me back a book on composting toilets and she said: "Oh Cath, you'd love this place and you'd love the compost toilets." And I was thinking, *Oh what's Teresa going on about compost toilets? It's going to be like pit latrines* and I read the book and I was like, *okay this is interesting* – nothing like pit latrines.

And then I just got really, really interested from that point onwards in all the different environmental aspects of plumbing and what's great about being a plumber is it is about water but it's also about all the heating systems, so solar thermal as well . . . And I never looked back really. Yeah.

Ben: Where exactly do we start with water? What is the first thing we need to have in our mind and to know about?

Cath: Okay. That's an interesting question. [Cath laughs.] Where do we start? I think there are three types of water that you need to think about, the water that comes into a building, the water that goes out of a building and the water that falls onto a building, which is basically rainwater which falls onto a building. So all of those types of water need to be addressed, how we use them, what we do with

them after it's been used, how we clean them etcetera and then with the rainwater that falls onto our building, do we collect that, store it, use it, do we try to get rid of it in a different way than we currently do in The West, which is pretty much just stick it into a drain and get rid of it which causes such a lot of problems downstream.

So I think it's difficult to say where do you start. We do or I do a lot of work in schools and in schools I always start with how do you use water. So where are the main things? Flushing the loo, washing – so showering and bathing – and kind of that's where I start.

Ben: And are we thinking about efficiency when we talk about those things? Why are we interested in water because I must admit up until this point that it became relevant I didn't really think of water as something that's important in a place like the UK where we tend to get a lot fair amount of rainfall? Not everywhere but we have done.

Cath: Okay, so there's different aspects, aren't there? If we look at water in a global perspective it's kind of really different. Some people really don't have enough water. Obviously some people have to walk miles to find water. A lot of people don't have tapped piped water to their buildings. A lot of people don't have adequate sanitation. So two of the Millennium Goals were about getting adequate sanitation to everybody in the world and safe water supplies to everybody in the world. So you could start from that very, very basic position that so many people in the world don't have a toilet even, practice open defecation. So many people don't have safe water supplies.

Once you move into The West, once you start to look at how do we use water efficiently then it's important for different reasons. You said we have plenty of water in the UK because it's always raining. Interestingly in the UK we have a lot of grey days with a lot of drizzle. So in fact we don't, in some areas of the UK we has less water per head than countries which you would think are very, very hot countries. So for example in the South East or London, people in London have less water available per head than people living in Spain for example. And you think, how does that work? Spain is always really hot when we go to Spain. Here it's not hot. So it's a function of how much water falls, it's a function of can you store that water, is it stored underground, is it stored in reservoirs? But then even once you've got access to that water, that water has to be cleaned, it has to then be pumped into our buildings. Once we've

used it, it has to be taken away and cleaned again before it can be put back again into the environment.

So all of that takes energy and that's before you even start to think about heating that water. As soon as you start to heat it, most of the time to heat it we're using fossil fuels so it's producing CO₂ emissions. Once you've got CO₂ emissions it becomes a global issue but within the UK, you know in effect within the UK our water use if it's just cold water is very much is just a UK issue. We're not a country – although obviously we have four separate countries within the UK – but we're not a country that shares a river basin. There isn't the potential for us to go to war with other people over water, which you know for example let's just talk about the River Nile.

The River Nile, I think something like seven countries take their water from The Nile. Seven countries rely on the water from The Nile but it's only Sudan and Egypt that actually have any rights, written rights, to water from The Nile. Sudan's recently split into North and Southern Sudan so that's caused more tension.

And we all need water to live, we need water to grow crops as well as obviously keeping clean etc. We use lots of water in industry. We use lots of water in mining. It's actually a huge, huge, huge issue and in some ways I would love to chat about that and we could certainly chat for hours about that but in some ways maybe we need to narrow it down a bit and start to look at it in terms of buildings within the UK. Otherwise I think that every question that you ask me there will be so many answers to it, it will be hard for me to give you an answer.

Ben: That's fair enough. Maybe I could just ask you one more general question, which if it has a million answers just tell me and we'll move on but is water always stored in the same way around the world? Or is this a situation of certain people just drawing from a river or from deep in the ground?

Cath: Okay, no. So basically your catchment areas are rivers so originally settlements grew up around rivers before there was that ability to then move water around but a lot of water is also stored in rocks, so underground aquifers. Some of those aquifers are quite shallow aquifers, so hand built or hand dug wells – you're able to access water. Others are very, very deep so haven't been accessible until modern machinery has enabled us to drill down through rock and to pump water up from hundreds of metres deep. So no it's found in different areas.

The thing about aquifers . . . In effect aquifers are like . . . Sometimes we talk about mining for fossilised water because there are aquifers around that were filled with water many millennia of years ago . . .

Ben: Sorry, what is an aquifer?

Cath: An aquifer is an underground reservoir of water and usually an aquifer is just the rock, the rock is permeable and so the rock holds water within it but it can actually be a body of water underground but usually it's water held within the rock and so you can access that water by drilling down. Now some aquifers, when it rains an aquifer will get recharged so most of the aquifers that we use within the UK, when it rains that aquifer or that groundwater gets recharged and it does that on a yearly cycle but there are some areas in the world where there is water . . . For example under the Sahara Desert there is thousands of cubic metres or thousands of cubic kilometres of water, fossilised water, water that fell there before the Sahara Desert was a desert, many, many, many metres deep but there is water under the Sahara Desert. That would be classified as fossilised water because that will not be recharged again if we accessed it, if we went there with huge, great big drills and pumped it all out and started to grow things in the Sahara Desert, we could do it for a while but it would just all disappear.

It's about with everything, really using a resource that's there that's sustainable so using it sustainably. So if it gets renewed every year because there's enough rain then that's great. Then we're using it in a sustainable way and that's really how we should be using water.

Groundwater is usually better than river water. It generally tends to be cleaner because it's filtered, because it's gone through the ground. It's cooler and it hasn't run away to sea. We've stored it, whereas rivers, it rains, it falls into the rivers, the rivers run into the sea and in effect we've lost it. I mean I know we get the water cycle and then condensation forms, we get clouds, it rains again but rivers are not seen as stores of water which is why we have reservoirs. So we say, okay, we've got this river running along here but we want to store that water so we take that water out and put it in a reservoir.

Ben: The Western world then, the approach that we would have, we just turn on a tap, we've got clean water, how efficient is that? Is that a good way of doing it because we're all here together. For example,

we're in London at the moment. Is that the best we can tackle it because it's all been cleaned or should we be doing more in the house?

Cath: Okay, well I think from a health and sanitation point of view the fact that we actually have piped water running into our buildings is very, very important. There's no way that we should go back to not having that. That is fundamentally important to our health and prosperity really as a nation, but really to health.

The other fact is that that water that comes into our houses it's cleaned. It has to be cleaned. It has to be cleaned to what we call potable water or drinkable water quality. We're only going to be drinking 1% of it. We might be cooking with another 1%, maybe 3% of it, but it all has to be to that standard. So, it's about recognising that and saying: "Yeah, you know, we're really really lucky to have this access to water. We don't have to walk miles to get our water or we don't have to buy our water from tankers, not in the UK, not in most of the Western world. We do have piped water. That's a privilege really not a right that we've got but what we need to recognise is that we need to use that water sensibly. We need to use that water . . . We need to understand there is a cost to that water both environmentally because of the energy to get it into our buildings. Once we've used it we've got to clean it, as I said before, that's more energy. It goes through our sewers, goes to the sewage treatment plant.

The water is there but we can't just use as much as we want. We need to understand that it's there for all of us but if everyone just goes: "Well, I just want to use 500 litres per day because that's my right as a citizen."

Actually that's not your right. In effect it's part of the commons, part of the global commons or part of the national commons. We all have a responsibility to use it as sensibly as we can.

Ben: Is this about us and our lifestyle or are there systems that we should be building into our house to make sure that we use the minimum amount of water possible?

Cath: Alright, so I think that it's a combination of both technological solutions and behaviour change solutions. Just technological solutions won't work and just behaviour change solutions won't work. So in terms of W.C. flush, W.C. flush back in the 1960s the maximum flush volume you were allowed was 15 litres. Before that there wasn't a maximum flush volume so you could be flushing with

20 litres. It was 15 litres, then it was reduced to 9 litres, then it was reduced to 7.5 litres, then in 2001 . . . 1999, 2000 it was reduced to 6 litres maximum flush volume. Now there are lots of toilets around that also dual flush so you can use 6 and 4 litre dual flush or even 4 and 2.5 litre dual flush. Most of the time we only have a wee. We don't actually need 6 litres to flush away wee so therefore we can use 4 litres or in very modern toilets . . . Or not very modern because 6 and 4 are very modern but you can use as little as 2.5.

Our toilet here in our house, we use 2.4 litres when we've just had a wee, so there is this sort of *if it's yellow let it mellow if it's brown flush it down*. Now I was a plumber for many years. I have seen the effect in London in hard water areas. If you don't flush the loo, the scale build up that you get, because there's scale in urine, so if you don't flush the loo and you let it hang around for too long you start to get scale. Then what people do is, *Oh the toilet looks really disgusting because it's full of scale* so then they put a whole pile of disinfectant down and scale remover and then environmentally that's actually really bad.

So my advice is always if you've had a wee, flush the loo. Yes, sure if you've had a wee and someone's going to have a wee straight away afterwards, maybe, but don't just go: "Well, I'm not going to flush the loo until someone has a poo." Because you will then just get these huge issues of scale build up and like I say you'll start to use chemicals.

So, you see, it's important that we save water, absolutely fundamentally it's important that we save water, but actually it's more important that we save hot water than we save cold water. In effect when you're saving hot water it's a win win situation.

The carbon footprint of cold water in the UK has been worked out at 1.2 kWh of electrical energy which translates into about 0.7kg of CO₂ for every 1 m³ of cold water that comes into our house and then, once it's been used in our house is then taken away and cleaned. That's for the cold water but once we start to heat that water then its footprint increases rapidly so now 6% of the UK's carbon footprint comes from hot water that we use just in our homes and this is why the government's very keen for us to reduce our use of hot water more than just water. What I'm almost saying is not all water is the same, that hot water has that extra added burden of CO₂ emissions in it and of course CO₂ emissions become a global issue.

Now technological solutions have been around. I was talking about W.C. flush being reduce, reduce, reduce, reduced! That's great. What we've generally tended to do with technological solutions in terms of hot water use is almost gone the other way. So it's like we've said, UK, we have what plumbers call coldwater storage system in the loft, what everyone else calls tank in the loft, we've always had very, very poor quality showers historically in the UK with a very low flow rate. Now we have pumped showers, which are called power showers. If you have a combi boiler you can get more powerful showers so it's almost as if the flow rate from showers has been increasing, increasing, increasing so technology has taken us the other way there. Instead of being more efficient, technology in terms of showers has become less efficient in terms of how much water we use.

So that's where behaviour change can have a real effect so still use the loo when you want it. Think about your water use. Think about how long you have a shower for. How long are you under the shower? Are you under the shower to wash and get clean or are you under the shower to solve the problems of the world? Are you having a bath to get clean or are you having a bath right to the top just because you want to. You know, if you have a full bath, that's 160 litres of water to fill your bath up and lie in it. The average person in the UK uses 150 litres of water a day so if you're having a deep bath every day you're using more than the average, that's just in the bath. If you have a shower, it depends on the flow rate from your shower, but if you have a 5-minute shower that's great. You'll use between 35 to – even if you had a power shower – you'll be using between 35 to 100 litres of water. But if you have a 10-minute shower, a 15-minute shower, a 20-minute shower and you also have a power shower . . . if you're having a 20-minute shower and a power shower you're using 400 litres of water. Most of us have a shower every day, so that's almost three times as much as the average just in a shower.

So it's about short showers, shallower baths, which is what I say, and that's really . . . Just think about water all the time and once you start thinking about water it becomes much harder to go: "Yeah, you know what, I'm just going to stay in this shower for 20 minutes." You start to think, hold on a minute. [Cath laughs.] Perhaps I should have less, yeah.

Ben: Is one of the problems that water is too cheap? I never like saying this because I know for a lot of people it's very expensive but theoretically for a working person they perhaps think, *Well I can just have whatever shower I like, I can have whatever bath I like.*

Cath: See, I would never ever use the argument really for anything that something is too cheap. Still only 40% of us in houses in the UK are actually paying for our water, for the amount of water that we use. 60% of us are still paying on what's called the rateable value so we pay a flat rate but that is changing. There is a sort of universal metering programme that is happening in the South East of England so more and more people are having to pay for water per volumetric, for how much water they use.

I think what would be much, much fairer is to say, okay, so the average use is 150 litres of water per day, we would like to get that down to . . . The government did used to have a figure of 130 litres. They've just dropped that figure as a target but they had a figure of 130 litres so let's say that we say, at a real base rate you can have 130 litres of water per day and you can pay for that at a base rate. If you want to use more water than that, obviously you can but that will cost you a lot more. If you have a medical condition that means you have to use more water then that has to be taken into account but if you just want to use more water because you want to stand under your shower for half an hour, singing, whatever, you can do that but you should pay a premium to do that. If you want to use loads of water in the garden because you want to keep your garden looking really nice and the sort of planting scheme that you've got, that's fine but you should pay more. To me that would be much fairer.

But it's also interesting this thing of you saying that water in the UK is too cheap or is it cheap? The cost of water in the UK varies according to what area you're in. So currently if you live in the Thames Water area so that's London and across from London, up to Oxford, Reading, their area, you're paying just under £2 for a cubic metre of water. If you live down in the South West in Cornwall and Devon you're paying £5.50 for a cubic metre of water. It's a massive, massive difference. So for people down in the South West to turn round to them and say your water's too cheap, their water is already over two and a half times as much as we're paying in other areas of England.

Ben: Nothing's ever simple! [Ben and Cath laugh.] It was just an idea. Okay, let's have a think about rainwater harvesting . . .

Cath: But Ben, can I just say that you say nothing is every simple but actually implementing everybody gets 130 litres per person per day at a real base rate I think is simple.

Ben: It's not going to backfire?!

Cath: What's not going to backfire? [Cath laughs]

Ben: Well, I don't know. Sometimes we've seen this before. We both know in certain systems, the Code for Sustainable Homes in the UK has been a tick-box but this one, there wouldn't be any side effects? I think that's all I was saying.

Cath: No, no, no. Not at all. I mean, in our house, I've already said about the 4 and 2.5 litres, we have flow regulation on all our taps.

Ben: Sorry, what does that mean? So you're just limiting it?

Cath: Yeah we have . . . Not really limiting but we set the flow rate, the rate at which water comes out of our taps, we set that using a bit of technological kit, something called a flow regulator but you wouldn't turn on any of our taps and think, there's not a lot of water. You wouldn't get in our shower and think, oh there's not a lot of water from any of them and I can guarantee that. We could go afterwards and I could stick you under the shower, Ben. [Ben laughs.] You can try it out. But because we have A) a very efficient toilet and also because we think about how long we're in the shower. I basically am in the shower a maximum of two minutes. I do the stop start shower method of showering, which is you get in, you get wet, then you turn the water off and then you do all the soaping up and shampoo and then you turn on just to rinse again. I am actually under running water for less than two minutes. My partner she's under running water for less than four minutes.

We use water in the garden – we use grey water in the garden, which we could probably talk about later possibly, but we still sometimes have to use tap water, mains water, in the garden and yet our average is 70 litres per person per day which is less than half of the national average. And we're not dirty. We're very clean! You know, we shower every day. So 130 litres, you won't backfire on that. That's kind of what I wanted to say there.

Ben: Okay, looking at rainwater harvesting because this was one of the questions that was brought up recently. Is it a good idea to incorporate in a house? What should we be thinking about when we consider rainwater harvesting?

Cath: Okay, so I think that what we want to do is we want to keep rainwater out of the storm water stream. One of the very first things I said right at beginning were the three types of water: water comes

into the building, foul water goes out and the water that falls on our building which is the rainwater. And we can do different things with that.

There is quite a movement and certainly that was driven a lot by the Code [for Sustainable Homes] that was saying: “Okay we need to collect that rainwater and we’ll use it in the buildings to flush toilets and for the washing machines.” And you can do that, that works, the technology is out there to make that work but what would actually be better and much simpler to my mind is that we collect rainwater and use it on the garden – for those of us who’ve got gardens and we need the water on the garden – but we keep rainwater out of the storm water stream. Instead of just going: “Oh my god here it is, here comes the rain, quick, get it into a drain, get it into a sewer, get rid of it,” that actually what we do is we keep it in the area.

There’s something called rain gardens which are a new thing. They’re not a new thing! They’re a new thing to the UK. It’s about just saying: “Okay, well we’re not going to put the rain straightaway into the sewers, we’re going to put it onto a planter, we’re going to run it into an area in the garden where there are plants.” Sometimes those plants will end up being inundated with water if it’s rained really hard but we allow it to just soak away into the ground and we keep rainwater out of the storm water stream because one of the big issues that we have in the UK, especially in our cities, is that our drains are combined drains. So we have both foul water sewage going into those drains and we have rainwater. And we have what’s called dry weather flow when it’s not raining and I can’t think what they call it! [Cath laughs.] Dry weather flow when it’s not raining and then the flow when it’s raining. I don’t know whether it’s called wet weather flow.

Our sewage treatment plants can cope with dry weather flow but when it rains what happens is there’s too much water for the sewage treatment plants to cope with and so that water which is a mix of both rainwater and foul water, and by foul water it’s all the used water from the house. So used water from the toilet, used water from the kitchen sink, used water from the shower, used water from the bath, etcetera. That then runs out of something called combined sewer overflows and it runs into rivers or it runs out into the sea. And that’s the big problem that we have. If we just took rainwater out of that and just kept rainwater by our buildings instead of putting it into the sewers, then we would only have dry weather flow in the sewers and our sewage treatment plants would always be able to clean the water.

Ben: If we've got water in a tank somewhere there's no side effect of it not actually being back in the system? Because if everyone put water into a tank, isn't that actually quite bad for the environment?

Cath: No, I mean I think that probably what you're asking there is an argument that I have heard that we require rainwater to give the drains a good flushing out or the sewers a good flushing out because the sewers are designed to cope with dry weather flow so . . . You should go into the sewers, Ben! [Ben laughs.] I have been into the sewers . . .

Ben: Maybe it's a video moment! [Ben and Cath laugh.]

Cath: Well, if you do, let me come down with you. That would be very nice. I'd love to go down again but anyway.

So no. Do you want to actually explain to me some more what you mean by that question?

Ben: I may be confused but say for example I've seen a few . . . An autonomous house for example that stores all its rainwater and I know that that water will eventually go out onto the land but there's nothing bad in the fact that rainwater, if a lot of it, is taken out of the eco system, even if it's just for a short amount of time but if everyone did that then all water would be stored? I don't know. Maybe there is nothing.

Cath: No there isn't. Well, okay, no there isn't. I have heard the argument that sometimes we need rainwater in the sewers because it helps to flush the sewers out but the reality is that you get rainwater in the sewers, it causes the problems that I've already talked about at the combined sewer overflow when you get a mixture of rain and raw sewage going out to seas or into rivers. As soon as it starts raining, all the sewer workers have to come back up from underground because of the issues, the danger of possibly being drowned underwater. It would be absolutely fine if we just all kept our water and yeah, it's kind of frustrating because it's almost such a non argument and part of me thinks, well I could go into the real minute detail of in this situation it could potentially be an issue. It's quite hard for me. I know this is supposed to be a generalised chat but also what's quite hard is I always want to go down into the nitty gritty and into the real plumbing bits. I do find it quite hard to stay quite general, so let me just say to you: "No it wouldn't be a problem" and leave it at that! [Cath laughs.]

Ben: Well, actually we're getting towards the end of our time now. I can't believe it. I don't think I've asked a lot of what I'd hoped to, so maybe we'll have to do another session . . .

Cath: Yes, we could have part two.

Ben: . . . Further down the track, but is there any fundamental part of this system, for people that are coming to build their own houses or to retrofit, that we haven't mentioned that is worth bringing up just as this final part 1?

Cath: Okay, so what I would say is if you're looking to retrofit or build a new one, go for the most efficient dual flush loos on the market and like I say there are a 6 and 4 but there are so many 4 and 2.5 litre dual flush loos out there now.

Go for a flow regulated shower. Go for a shower that comes directly off the mains so you either put in an unvented hot water cylinder or you have a combi boiler but that means that your water is coming in at high pressure, so you've got good pressure and then you can have a shower that's flow regulated down, ours is flow regulated down to 7.5 litres per minute. The government's currently considering whether to have maximum flow of 10 litres a minute of a shower in new build. I hope that that regulation comes in.

So I would flow regulate down, shower to 7.5 litres a minute, I would put flow regulation on the taps, kitchen taps to 6 litres a minute, wash hand basin taps to 4 litres a minute. I would still stay with a standard sized bath because those tiny little baths, if you do want to have a bath, most people want to have a bath to relax in so stay with your standard sized bath.

I would say if you've got a garden, collect as much rainwater as you can to use it in the garden. Look at not connecting any of your rainwater downpipes into the drains. So use that water in your garden. Like I say you can just use it in rain gardens, when it rains, run it off into an area of the garden and just plant that area of the garden with different plants than you would plant in other areas because those plants will need to be able to cope with being inundated with water, having their roots sitting under water for some parts of the year.

Look for permeable surfaces, so any hard surfaces that you're building, you can look for permeable surfaces there. You've got permeable paving or just gravel. Don't have big areas of concrete around.

You can consider what we do here. We actually use the grey water, which is the water from our shower and our wash hand basin, we actually use that in the spring and the summer on our garden. We don't bring it back into the house because there's huge issues with grey water if you bring it back into the house because it's got bits of skin in it, it's got bits of soap, it's got bits of hair. It decomposes quite quickly but if you use it out in the garden that's a really good way to use water.

Then in terms of your behaviour, I think one of the really good things is a small shower timer. All the water companies are now giving away 4-minute shower timers. People don't really know how long they're in the shower, so if you ask people, oh how long are you in the shower, oh I don't know, 10 minutes. I don't know. 10 minutes, maybe 15. If you give them a shower timer and then get them to time it they are sort of: "I was in the shower much less than I realised." So I think that so many people think that, *Oh it's going to be really difficult to use much less water* but actually it's not. That's probably the easiest things to say and do.

Ben: Well Cath, thank you for some great information today and we'll look forward to part two.

Cath: Sounds good. Thanks very much, Ben. I enjoyed it greatly.