

# Sea Change

## Sea Change, Episode 1 – Sir Ian Boyd



**Scottish Fisheries Museum:** Hello and welcome to Sea Change, a podcast series by the Scottish Fisheries Museum. This podcast asks a selection of the most knowledgeable people their thoughts on the current situations facing our seas, and what they think the future looks like.

**SFM:** Today I'm with Sir Ian Boyd - and I'm very excited to have a chat with you today, Ian. I wondered if you might be able to just start by telling us a bit about yourself and your work?

**Ian Boyd:** Yes, okay, well I'm a Professor at the University of St Andrews, and I've been here off and on since about 2001, but before that I was a researcher working on a major research programme in Antarctica for 14 years and it was mainly focused on the Southern Oceans and the ocean around Antarctica, and it was focused on trying to understand the dynamics of that ocean in relation to human exploitation, which includes fisheries and that sort of thing. More recently I have been the Chief Scientific Advisor to the UK Government on Food and Environment based at DEFRA in London – I was in that post for 7 years – which gave me a very broad view of what the major challenges are, many of which are actually located in the ocean, so this is a very interesting conversation to have and I'm looking forward to it.

**SFM:** Absolutely, and I think that's a really interesting point – that everything that informed your work there starts with the ocean. This was something that came out in another of our podcasts, just

how central the ocean is to absolutely everything. So hopefully we'll get a great discussion here for that reason! So, our first main question here is about how you have interacted with the seas in your work, and you've sort of alluded to that already.

**IB:** I would describe myself as a Marine and Polar Scientist – that's kind of been my career, my background. It's probably a bit more marine than polar, because actually since coming to the University here in 2001 I've mainly been focused on marine science - that's about leading marine science strategically, so that means being Director of the Scottish Oceans Institute, and being an inspiration for other academics working in areas that are not my specialisation. But my specialisation has mainly been marine mammals, to some extent seabirds as well, and that's included things like penguins and albatrosses, but most of my work has been on seals, and to some extent whales, but it's been focused on trying to use those as indicators of what's going on in a very large place. The marine environment is huge – it's very complex, it's very dynamic, and these animals because of the way they live their lives, actually can go out there and essentially sample that environment for us – and if you can understand their behaviour and their population dynamics, it's telling you something about what's going on in their world. And being able to boil that down in such a way as to be able to then feed that back in to how we interact with that world, particularly in fisheries management, but in other areas as well, then that can be a very useful thing to do. The areas other than fisheries management that I've worked in have been in the impact of sound in the marine environment, we produce a lot of noise when we go into the marine environment – mainly ship noise, but we also produce a lot of noise from things like sonars, and I was very interested in what the effect of military sonars was on whales and I did some major experiments actually on behalf of the US Navy in the Bahamas looking at the response of beaked whales to military sonars as well. So, a lot of my interests have been around the human interaction with the ocean, but seeing it through the lens of

animals that actually call the ocean their home, and seeing their reaction to that human interaction.

**SFM:** I think that is such a key point – it comes back to this idea that there is this disconnect between humans and the oceans, and I think people genuinely wouldn't necessarily think about the noise under the sea – I think the vast majority of people don't necessarily make that connection. And that idea that the animals are samplers for what is going on under the sea is a fascinating one – I'm really excited to hear you expand on that. Our next question is about how you go about engaging the public in your work – and I guess that will have changed slightly in the different roles that you've had over the years, but it would be interesting to hear your thoughts on that.

**IB:** Well I think through my career, and I've had a fairly long career, the whole emphasis on engaging the public has actually changed enormously. I think in the early parts of my career as a scientist it really wasn't something that scientists were expected to do an awful lot of – and we were never really trained to do it, there wasn't much incentivisation to do it either, but actually that has changed tremendously through time, and it's a good thing that it has changed as well, because scientists whatever discipline they are working in need to be able to explain what they are doing to the public in ways that engage the public because actually most of science is paid for by public money and so it is absolutely essential. But in terms of methodologies, obviously if there are interesting things come out of research then one tries to explain that in the context of national media by producing press releases and those sorts of things, and that is something that has been a fairly major part of my activities, but overall what I like to do is engage the public more one to one and directly through providing public lectures, which I've done quite a lot of in the past, both about my Antarctic work and to some extent about the work I did with whales, but also even more so while I was Chief Scientific Advisor in the UK Government, because there I was

trying to engage with a very broad swathe of the public, everything from farmers to fishermen to people who were concerned about plastics, to people who are concerned about food waste and all those sorts of different things. And the engagement process is both that one to one, kind of providing lectures, providing information, writing blogs, I've written a lot of blogs over the last 6 or 7 years or so, which some people read I think, I sometimes get feedback on them, but also you have to sort of segment the public to some extent in this respect – and the public is everything from a senior government minister, maybe a cabinet minister, in my view all the way through to just the person in the street who's just interested in what you're doing and you have to use different methodologies for working with all those different groups. It's a big task to do and some people are better at different parts of it than others, but a lot of the work I have done in terms of trying to engage the public over the last through years has been to produce summary reports of some of the big challenges we have – I did one on resource and waste, but I did one on the oceans. It's called the Future of the Sea report, it was a foresight analysis that looked at the big trends that are going on in the ocean and saying well, actually, if those trends keep going, what is the ocean going to look like in 20, 30, 40 years' time, and how do we as a country respond to that in terms of the kind of policies we want to put in place, and the sorts of things we want to do with the oceans. So, a report was produced on that, and it has had quite a lot of influence in terms of the formulation of public policy in London. So, it's a complex and dynamic mechanism process, but its one of actually listening as much as it is giving information, and I think the listening part of it has not been emphasised enough of the time. I think that's why we see a lot of the kind of protests we have on the street for Extinction Rebellion and things like that – there are people out there who have real concerns, and they feel as though they are not being listened to as much as they should be, and part of my job was to try and translate that listening process into messages for people particularly inside government who are making decisions that will affect people's lives.

**SFM:** Absolutely – I guess its about arming people with the knowledge, and listening to their concerns, isn't it? That's the two-way process. So, our meatiest question, perhaps, in this interview, is about how your work has broadened your understanding of the issues that are facing our seas. I am very curious to hear your thoughts on this.

**IB:** Well, I suppose I started like any scientist with quite a narrow focus. I've already mentioned I was focused on marine mammals and seabirds. My interest in them was driven mainly by what they can tell me about the general state of the ocean. But as my career has gone on, I think my interests have got broader and broader and they've ended up being interests around what is going on in the whole of the global economy that is then affecting the ocean, and vice versa how are the dynamics of the ocean feeding back to affect us as consumers of the services that the environment gives us. And those are really big issues, my view is that we actually have a huge effect on the ocean – I don't think that its just my view, I think that there's lots of evidence for that. There's a huge number of human-based impacts that are happening in the ocean, from ocean acidification, through to eutrophication, through to the direct physical impacts of fisheries, through to the ecological impacts of fisheries, through to diffuse pollution and a whole host of other things, many of which until relatively recently were thought to be within the ocean's capacity to absorb, and we now know – I think a generation ago there was a lot of scepticism about whether we really did have impacts but now we absolutely know we have these impacts – the ocean is changing as a result of that – we need to understand what the drivers behind these impacts are – and many of them are driven by things we do in our everyday lives. We could talk about PCB pollution for example, PCBs occur usually within electrical systems, sometimes in the sealants for windows and things like that – those are extremely poisonous chemicals that are extraordinarily stable, and if we do not dispose of them appropriately, they will end up in

the ocean – and a lot of them have ended up in the ocean, and they are being concentrated through food chains, they are almost certainly one of the reasons why killer whales around this country pretty much no longer exist. We do have some killer whales particularly in the far north, but some killer whale populations have disappeared almost certainly because of those types of pollutants being biomagnified through the food chain. So we have to understand these types of effects, and we have to understand that actually it comes from a lot of things we do in our everyday lives, in the terrestrial environment, in our own homes, in our own cities, when we drive our cars along the road, it is not disconnected from what is going on in the ocean - and I think that's a really powerful message that people probably need to understand. I think as you said in your introduction, we tend to feel a bit disconnected from the ocean, it's out there, it's over the horizon, we are not seeing it in our everyday lives. But that doesn't mean to say we're not affecting it.

**SFM:** Absolutely – it's this idea of sea blindness, isn't it – that concept.

**IB:** Exactly, yes, it's sort of out of sight, out of mind, sort of the ocean a lot of the time. And there's another aspect to the ocean – it's this issue of common ownership. With land, at least we have an ownership structure for land, you know, in the ocean we are only just developing that with coastal zones and extended EEZs and things like that, which are giving appropriate governance for the ocean. But we mustn't forget that the ocean is just this big liquid that's slopping around, and things move around within it, and we need to be able to govern the ocean jointly – because if we don't govern it jointly, we can't govern it in small parts, in the way that we sometimes govern land. So, we can't take a terrestrial focus, terrestrial values-based system and apply it to the oceans in the same way with how we manage land.

**SFM:** It's kind of like a universal thing, isn't it – everyone is affected by the ocean.

**IB:** Exactly, I experienced this with Antarctica as well – Antarctica is a continent that isn't state owned, there are state claims within it but those claims have been suspended using the Antarctic treaty, so it's an international territory and the ocean is very much like that. And there are of course government structures around it, but the question is, are they strong enough and are they effective and I think many people would say they're not strong enough, and they're not sufficiently effective at the moment.

**SFM:** Do you think that's something that has come into people's awareness really recently? That idea of it needing to have sort of stronger controls? Is that a recent development would you say?

**IB:** Well, it depends what you mean by recent. I certainly think it's developed over the last 30 or 40 years, if you go back to how fisheries were structured and managed after WW2, through 1950s, 60s and maybe into the 70s, it was pretty much a free for all, and gradually we've brought management in to bigger and bigger parts of the ocean to try and get that under control. But it's been a long and difficult process to get that management and control in place, and in many parts of the world it still doesn't exist – I think that we shouldn't be complacent about this. Around the UK, in European waters, we've got a pretty highly developed management structure for the ocean, we've got the OSPAR regulations which help to manage the whole of the North East Atlantic area, in collaboration across all the coastal states in the North East Atlantic – you know, that sort of collaborative approach doesn't exist in many other parts of the world, where there are huge pressures on the ocean. I think they will get there with it, but they will probably only get there because they understand that the current system that they have is completely unsustainable, and that they will all lose unless they get proper

governance in place. And it's sad to say that's one of the reasons we have that governance in place, actually we were beginning to see the really negative effects of not having it. So, everybody has to learn by their mistakes, but unfortunately the thing that suffers at the end of the day is the ocean.

**SFM:** And it's a matter of urgency.

**IB:** It is.

**SFM:** I wonder whether the fact that, you know, especially us in Scotland, we live, lots of us, by the sea, and maybe it's more difficult to comprehend when you're in a land-locked country, the immediate impact you have on the sea, I don't know.

**IB:** I think if you have direct contact with it, if you have the opportunity to go walking on beaches and you see litter on beaches, many people start asking questions – why did that litter get there, is there something I can do about it? Those sorts of things start adding up. However, what I would say is that a lot of the problems in the ocean are not immediately visible to people. It isn't like a land-based system, where if somebody goes and cuts down a forest, you see it – if a kelp forest just disappears in the oceans, actually you wouldn't notice it. But in terms of its ecological impact, it's at least as big if not bigger than cutting down a forest on land. It's hard for us as terrestrial animals to really fully comprehend the scale of the changes that are going on in the ocean. Many of them are chemical as well – ocean acidification, we're not organisms that require calcium carbonate to make shells, so we're not really worried too much about that. If you're a mollusc that requires a shell, then it's pretty serious – if you've got something that's acidic and going to dissolve your shell! So we're not faced with it on a day-to-day basis, and that actually means that it's quite hard for us to make intelligent



decisions on a day-to-day basis about what we do, decisions that are designed to reduce the impact that we have on the ocean. In order to do that I think we, and I say we as in scientists but also communicators, need to be able to feed that information back to people in such a way that they can have the information to be able to make intelligent decisions and they can understand that doing one thing has a bigger impact than doing another thing. And we frankly haven't been very good at doing that at all- not just about the ocean, but all sorts of different things.

**SFM:** Absolutely – just get that message out there, so hopefully this podcast will help with that.

**IB:** Well I hope it will raise the attention in people's minds.

**SFM:** That's our hope. So, here's an interesting question for you – if you could tell someone something they might not know about the sea, what would it be?

**IB:** Well, I think there's lots of interesting things – I think one of the things that has interested me mostly recently is the idea that sea level is not the same everywhere in the ocean. We talk about sea level rise, actually sea level rise is a very difficult thing to measure – because even though if we take water and put it in a container, it will automatically level off – so the surface of water at one side of the container will be exactly the same as the surface of the water at the other side of the container. In the ocean it's not like that – the ocean is a big place, and for example, one of the reasons why sea level is slightly lower in North West Scotland is because of the gravitational pull of Greenland and the Greenland ice caps, so water is being pulled northward by the Greenland ice cap. That sort of piece of information I just find fascinating – but it actually adds complexity to our understanding of sea level rise, and in some places it is going to rise faster than others, and for

some people that is actually quite a challenge. If they're trying to think well what do I do about sea level rise, well actually in one part of the country its going to rise faster than the other, well what's going on here? It's a really rather strange thing to happen isn't it? But there are very good underlying reasons for that, but sea level is really a difficult thing to measure.

**SFM:** It certainly sounds like it, that's for sure. I guess that leads us on quite nicely to our second last question, and that idea that you feel like if the scientists don't have control over the seas, how can we have control over the seas? What can our listeners do to play their part in the next 50 years of the sea?

**IB:** I think I've kind of said it already – I think you have to be inquisitive and want the information. And when the information about the ocean and what we do to the ocean is provided, be sensitive to what we do in our everyday lives that is going to reduce that impact. So, what I really hope we will get a lot better at doing is providing people with the information they need to be able to make informed decisions. What I would ask people to do is to receive that information with an open mind and to work with it in their daily lives to try and improve what they do to minimise their impact on the ocean. So that's really it. There are lots of other things about engagement, with cleaning up beaches, all those sorts of things are really, really good, but actually we'll make the biggest impact if we all, let's say, reduce our impact on the ocean by 25% simultaneously. And we can do that. Its possible for us to do that just by being more intelligent about what we actually do with our lives.

**SFM:** Change starts on land.

**IB:** Change starts on land and it's about behaviour change, its about us changing the way we do things. Its not about turning to

the ocean and saying well actually we need to manage this bit of ocean differently – it's us that are the problem, and we need to change ourselves.

**hSFM:** Yes, a call to action! So, our final question for your today, Ian, is about where you see the seas in 50 years' time – a big question, but one I feel that you are quite well equipped to answer.

**IB:** Well this may be a bit challenging for people, because actually I see the seas in 50 years' time in quite a significant worse state than they are at the moment, and that's because we have already set in train a whole range of different things that are going on that because the ocean moves quite slowly and it mixes really slowly, and it's very big, I think that despite the fact that we might start doing lots of good things between now and 50 years' time, the effects of what we've done over the past 50 years will still be being felt and still be being pulled through, and one of the best examples of that is ocean acidification. That is going to take hundreds of years, possibly even thousands of years, to work out of the system. Even if we get our carbon emissions under control over the next 30 years or so – the effects of ocean acidification will be seen for many, many generations down the road. So there's a slightly negative message there – I think there's a positive message in that some things will respond very quickly, so if we talk about fisheries, I think we will start to get the fisheries impact much more under control, particularly in the tropics. I think that round the UK we are reasonably good at it, we could be a lot better at it, and we will get a lot better at it, and we'll start seeing, especially around the UK coast, we'll see our coastal strip becoming more biodiverse again. If we look at, say, the east coast of the UK, the Firth of Tay, the Firth of Forth, they used to be actually very diverse communities through a variety of actions, some of which are because of industrial pollution but some of which are because of fisheries, we've almost denuded them of the biodiversity that was there. I think in 50 years' time we could have reversed that, so we

could see some really positive change. But at the background of this is some of these long-term things that are going on, that we need to start now to correct them, but they will still be having quite a negative impact.

**SFM:** I think that's the thing – it's about keeping the faith, really, isn't it – if you don't see immediate results, you have to have the faith that they will have an impact.

**IB:** I agree.

**SFM:** But also, that's a very hopeful message, I would say – there's the chance to make a difference.

**IB:** I mean, it's quite possible to become very depressed very quickly if you look at some of these sorts of things – but actually, I think that we need to take a very positive attitude to it. And if we do, and we do it on a large enough scale, and we think big, and broad and are really ambitious, we can actually turn it to a positive message. You know, we have the power to change this, there's no doubt about it – we have that power, but we need to change ourselves to do it.

**SFM:** Absolutely. Well thank you so much for ending on a rousing note there, and thank you for speaking to me today, Ian – it's been absolutely fantastic.

**IB:** It's a pleasure, thank you very much.

**SFM:** Thank you so much.