William Bond: excited about the future of South African science

Author:
Jenny Leonard[1]

Affiliation:
[1]Department of Botany, University of Cape Town, Cape Town, South Africa

Correspondence to:
Jenny Leonard

Email:
jennymleonard@gmail.com

Postal address:
University Private Bag, Rondebosch 7700, South Africa

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William Bond, one of South Africa's best-known ecologists, describes his career path as a series of 'arbitrary' decisions: 'I'm amazed that some people actually plan careers.' It was not Bond's plan to become an academic – he simply wanted to be a person who solved ecological problems. After matriculating in South Africa, he attended the University of Exeter in the UK, graduating in 1970 in the combined honours school in Botany, Zoology and Geology. After graduation, he found that he did not have a mentor within South Africa: 'I think that helped at the time because it gave me more freedom of thought.' His first job was surveying natural resources in Mozambique, after which he worked on the Cabora Bassa Dam, then under construction, where he headed up a unit to control floating aquatic weeds and explore options for a lake fishery.

When the project ended in 1976, he got a job with the South African Forestry Department, where he thought he would be working on catchment hydrology, which he had been interested in for a long time. But the department had a different idea: 'I was the first non-forestry graduate student they had employed. And they were doing that because they realized that fynbos was interesting and that they didn't know how to classify it or describe it or manage it.' At the time, the department was responsible for the management of all of the nation's mountain catchments, and it had set aside conservation areas that needed protection. The department managed these lands as a national resource and had wisely decided to employ people from outside the hallowed halls of forestry to explore, quantify and classify the fynbos.

Bond was given the task of mapping mountain catchments, but he 'got a bit bored with pattern … I like dynamic things.' He noticed that every time there was a fire in the fynbos, there would be very dramatic changes. There was something particularly odd about a burnt area in the Swartberg Pass. The fynbos had been burnt in different seasons and the response of the proteas seemed quite different. At the time, the recommendations for burning were based on experience from the grasslands from the eastern part of South Africa, specifically from the Drakensberg. There, burnings were delayed until the first spring rains when it was warm enough and wet enough for grasses to start growing. By delaying, the soil would be exposed to minimal rain and erosion. Bond's observations were that spring burns caused a complete collapse of protea populations with a reduction in density of an order of magnitude.

Based on that experience and other observations after big fire events, he became interested in the dynamics of fire and fynbos. 'We were beginning to work with people from other Mediterranean regions of the world because of the idea of convergent evolution. It was exciting because for the first time you could put yourself against big names. Then you met the big names and realized you could discuss things with them.' In Bond's estimation, South Africa at the time was in desperate need of collaborative input from abroad, because much of South African ecology was very descriptive and based on pattern analyses and mapping: 'We didn't know how to do experiments, we hadn't had any theory, and there was no conceptual framework.'

As part of the research interest associated with convergent evolution, an avian ecologist called Martin Cody came to South Africa in the late 1970s. Cody camped out at the Saasveld Forestry Research Station near George where Bond was working. Bond had been working there for quite a while and was amazed that Cody knew so much about a landscape in which he had never worked. 'What he had was a body of theory which opened his eyes so he knew what to look at and what to look for. And he was making predictions about systems he had never seen before.'

That was the beginning of Bond's path to academia. He had a chance to visit Cody when he was on holiday in California in 1981, and they toured Californian landscapes for a couple of weeks. Bond saw California as a 'fantastic, very interesting place, and very diverse ecologically.' At the end of the trip, Cody asked Bond if he wanted to do a PhD with him at the University of California at Los Angeles. Bond says it was a big decision, but he ended up accepting Cody's offer – 'It's a sort of arbitrary thing. Still, a life changing thing.'

On finishing his PhD in 1988, Bond joined the staff of the Botany Department at the University of Cape Town (UCT). 'The position to which I was appointed wasn't for an ecologist, which is what I saw myself as, it was for a reproductive biologist. So I didn't do any lecturing in ecology in the first few years.' But this position did not prevent him from continuing to think about and research, fire and fynbos. And despite the late start to his academic career, in 1993, after only 5 years, Bond was appointed to the Harry Bolus Chair of Botany at UCT.

Bond believes that fynbos largely exists in its current extent because of fire. 'The link with winter rainfall is indirect. What winter rainfall does is create a unique fire regime.' It is this fire regime under which fynbos thrives. For the last 200 years scientists have tried to correlate vegetation with climate, and then are amazed that their vegetation *units* correlate with climate. Bond points out that this is the most appalling circular reasoning. 'It assumes that for each given climate there is one ecological solution and one vegetation type. All over Africa that isn't true; forests occur in the same climate as fynbos and grasslands occur in the same climate as forests.'

To test his theory, Bond asked Ian Woodward from the University of Sheffield to try and simulate, using models based on physiological processes, what the vegetation structure should look like along a rainfall gradient if few other factors were involved. The model was supposed to mirror the actual vegetation in and around Bloemfontein. 'It was a marvellous model,' says Bond, 'because it was completely wrong.' This model showed Bond that vegetation was not at equilibrium with climate. Further models showed that the entire eastern side of the country should be forest but is not. When fire was added to the model, it began to look more like South Africa. When Bond, Woodward and others extended vegetation simulations to other parts of the world, they found that huge areas of the tropics are not as woody as they should be. 'It was a very, very, important turning point because it made people realize that fire is of global significance in shaping the biogeography of vegetation.'

Bond wrote the book *Fire and Plants* together with Brian van Wilgen in 1996. Although it was a difficult process, he marvels at how much he learned and how the book was received by the scientific community. 'There has been an absolute explosion of work on fire. We've now proposed that the spread of angiosperms is a fire-linked phenomenon, similar to the spread of grasses. But it happened 100 million years ago instead of 8. There is a whole lot of work now that is supporting that.'

Bond reaches retirement age at the end of next year. 'I haven't really embraced it with enthusiasm.' He has research funding that will keep him at UCT for the short term. He is also interested in writing a book on South African ecology with a historical perspective. 'The story of C_4 grasses is just amazing. And we don't have answers. I'd love to give people a sense of just how peculiar and just how remarkable they are.' Besides the book, it is unclear in what direction Bond might go. But it is clear if you speak with him that he is excited about the science that is being conducted in South Africa. 'The advantage of being away from the main stream is that you are able to develop ideas and concepts that maybe would be snuffed out in places that have larger science centres.' The one thing we can be sure of is that he will follow opportunities and curiosities wherever they may lead.

William Bond demonstrates the finer points of vegetative sprouting to a student in the field (photo: Anabelle Cardoso).