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Editorial

Water shortage: a glimpse into the future



Imagine a situation in which every person uses 300 liters of water per day, and the maximum delivery of water could not surpass 150 liters/person/day. Now, multiply this figure by 1.7 million during 10 months of a calendar year, and by 4 million during a two-month summer. The result will be the amount of water consumption expected by 2030 for a region in the State of São Paulo, Brazil, known as the Baixada Santista. Every summer, when its population increases to over 2.3 million owing to tourism, this region suffers from water scarcity. This is the region with the highest rate of population growth in São Paulo (SAEDE, 2013).

Issues with water shortage are not new. But recently, this debate has gained attention worldwide, and particularly in Brazil. In a recent paper, Schiermeier (2014) highlights that up to one-fifth of the global population could suffer severe shortages in water supply if the world warms 2 °C above the present level. Scientists now suggest that even modest climate change might drastically affect the living conditions of billions of people. Climate change deniers would say that climatic models and projections are uncertain. While there are uncertainties in climate modeling, this particular situation of water shortage has been observed during the last decade in many places of the planet, the Baixada Santista being just an example of how predictable a dramatic situation could be in the future. This “live experiment” conducted every summer in Brazil provides us a glimpse into the future before it takes place. Climate change will only make the things worse, with it accompanying irregular patterns of water precipitation.

In fact, this raises the question on why Brazilian researchers working in environmental sciences have a poor engagement in conservation policy. Regardless the reason for such a poor engagement, researchers interested in policy-relevant conservation science must think outside the box. It is well known that reframing the issue at stake could cause significant shifts in political debate (Riker, 1986).

The revision of Brazil's main environmental legislation on private land – the Brazilian Forest Act – is an example of an improper discussion of an issue at stake could have very negative outcomes related to the conservation of biodiversity (Metzger et al., 2010). In Brazil, the Forest Act establishes conservation requirements for land that may not be deforested inside private property (Metzger, 2010). These requirements

protect about 53% of all native vegetation in Brazil (Soares-Filho et al., 2014). After the reformulation of the Act, the area covered by native vegetation could be reduced by 87% (Loyola, 2014). During the reformulation of the law, scientists argued they were not heard. Their engagement, however, was only reactive and when it arrived, the scene had been already set by politicians. Further, most of the arguments for preserving natural vegetation within private land were focused on the maintenance of biodiversity *per se*, although the loss of ecosystem services was also mentioned. Academia played a key role in the final statements of the law, but the public perception is that the environmental movement in Brazil became weaker, compared to the lobby of other sectors of the society, such as the agribusiness. Today, a discussion on the likely negative impacts of this new law on the society is arising again, but with its message reframed: changes in the Forest Act are responsible for the recent water crisis we observed in southeast Brazil, in particular in São Paulo. This new way to address the issue might have more impact on policy, given it is much more graspable and related to the needs of people.

Brazilian authorities have a moral obligation of acting before things become worse as they already have the data for taking decisions and fostering economic and social policies to deal with water security issues. In fact, we are in desperate need for a more mature evidence-informed conservation science in Brazil. Recognizing that scientific evidence is another factor in a complex decision-making process is an important first step (Adams and Sandbrook, 2013), but we need more. To increase the importance of their policy advice, Brazilian scientists need to reframe their research within salient political contexts. Some scientists, of course, are not comfortable with an “advocate” position, and they are in their own right as this is ultimately related to one's personality. However, as argued by Rose (2015), engagement with the policy process is desirable for conservation scientists because “conservation attempts to achieve an objective that is extrinsic to science itself, notably the protection of nature in practice”.

Finally, new generation of conservation scientists in Brazil would need to learn how to engage with decision and policy-makers. There is need for courses, preferably within Grad Schools in Ecology and Conservation Biology, which addresses these questions. Courses on science communication and

science outreach should integrate the next generation curriculum of universities, so these scientists have the desirable skills to advise policy-makers in Brazil and elsewhere. The educational challenge would consist in teaching about the difficulty of informing society about evidence-based environmental issues, suggesting policy makers to take unpopular decisions and, at the same time, without being alarmist for the sake of being heard. Also, we are of the opinion that funding agencies should increase their support for projects related to science outreach and reward scientists working closely with decision and policy-makers. Thus, the agony between publishing peer-reviewed papers or engaging with environmental issues in a political context would not be considered a trade-off, but rather a natural step, after scientific evidence has already accumulated.

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