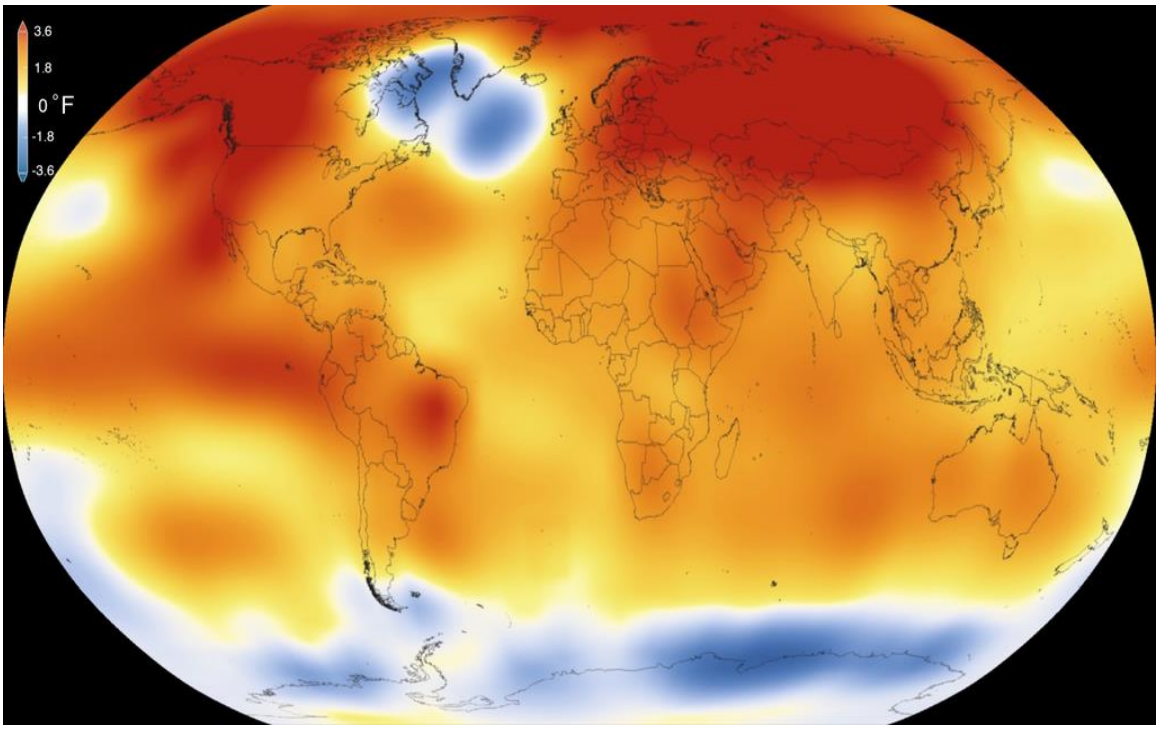
Learning within & about climate science

What has transdisciplinary engagement through FRACTAL taught us?



FRACTAL Briefing note | April 2018 | Produced by Alice McClure

FRACTAL

Future Resilience for African Cities and Lands (FRACTAL) is a trans-disciplinary group of researchers from partner organisations around the world. Together with a broad range of stakeholders, they are working to co-produce relevant knowledge that will support resilient development pathways and enable decision-makers to better integrate pertinent climate knowledge into their resource management decisions and urban development planning. FRACTAL is a four year project within the multi-consortia Future Climate for Africa (FCFA) programme - jointly funded by the UK's Department for International Development (DFID) and the Natural Environment Research Council (NERC).

These knowledge products have been developed to share findings from the research in the hope of fostering dialogue and eliciting feedback that strengthens the research. The opinions expressed are those of the author(s) and are not necessarily shared by DFID, NERC or other programme partners.

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FUTURE CLIMATE FOR AFRICA

FRACTAL
FUTURE RESILIENCE FOR AFRICAN CITIES AND LANDS

Introduction

This briefing note provides key discussion points from the second FRACTAL learning webinar, during which the team reflected on the role of learning in integrating climate science into decision making. Chris Jack, co-PI and co-chair of the climate cluster, facilitated the session which included an introductory presentation on learning in the climate sciences (from his perspective), as well as a brainstorming session on what team members have learned through FRACTAL, within and outside the climate science discipline.

What does it mean to learn in/about climate sciences?

Chris kicked off with a dictionary definition of learning, which is the; "**acquisition of knowledge and skills through study, experience or being taught**". He considers this a good starting point for thinking about what it means to learn in the climate sciences. Chris also described a few simplified **learning processes** with examples from the climate sciences; i) learning something one didn't know previously (e.g. to use a provocative statement, some parts of Africa might be cooling); ii) adding evidence to ones existing belief (e.g. I now have evidence of increasing rainfall in Cape Town); iii) adding evidence to contradict ones belief, which leads to new beliefs; and iv) being able to do something better through skills development or experience. Chris then went on to present examples of climate science activities that do not necessarily entail learning (based on the processes described above) such as running a climate model… the output or experience might result in learning but the model on its own is not a case of learning. He also used the example of presenting projections to a decision maker, which may or may not involve learning on the part of the climate scientist as well as the decision maker. Chris described that it's **useful to interrogate where and when learning happens in these activities, and that there are many ways to learn. We should consider this when trying to understand learning**.

In the context of FRACTAL, Chris described, there's been lots discussion about what counts as evidence when so much subjectivity is introduced into the learning processes. These discussions are aligned with academic discourses about the continuum of **normal to post-normal approaches to science and enquiry**. 'Normal' science is characterised by principles, values, sets of assumptions and framings on which many people agree. This type of enquiry is suitable in instances when uncertainty and decision stakes are low. The next on the spectrum is 'consultancy science', during which uncertainty is incorporated into decision making. Within these processes, which are more suitable when uncertainty as well as decision stakes are higher, stakeholder awareness is introduced. Last on the spectrum of approaches is 'post-normal science', which is appropriate when complexity is irreducible, uncertainties are deep, a plurality of perspectives and values need to be integrated, decision

stakes are high and urgent decisions need to be made. Chris suggested that the latter is much of what FRACTAL is dealing with.

Chris then introduced the idea of **ethical epistemic challenges** for climate science; how does what we believe shape what we know? What power do we wield knowing the things we know as climate scientists? What are the consequences of our beliefs, framings, assumptions and values? And what do these all mean for FRACTAL?

As an example of the complexity described above, the decision scaling work in FRACTAL is pointing to the fact that climate change won't be a big risk for flow coming out of the Kafue River, which supplies water to Lusaka. Chris reflected that it's been an interesting and challenging process, as a climate scientist, to attempt to integrate this message into the discussion in Lusaka, which involves lots of concern related to the flows of the Kafue in the future. Although climate might not be a major stressor according to the modeling work (though more work needs to be done), the way in which climate will intersect with development in the future, and possible many other stressors, is unknown… So, the question is, **how strongly do we push the science output into a space that's a lot more complicated**?

Breakout groups: what have team members learned about climate science

After this initial introduction, the team broke into two groups (climate scientists and non-climate scientists) to discuss **what team members have learned about climate science through FRACTAL**.

During the feedback session, the climate scientists presented the following learnings:

- Reasons behind the Global Climate Model (GCM)/Regional Climate Model (RCM) downscaling contradictions, as well as some evidence supporting the idea that the RCMs don't change the large-scale circulations, they rather influence rainfall processes. This supports some existing information about RCMs.
- The effectiveness of communicating climate science through narratives and games.
- Genealogy work; exploring characteristics of observed datasets and how the relate to one another.
- Lots about process chains.

Chris mentioned that there is lots more learning coming out of the FRACTAL climate science work but the discussion inevitably tends towards discussing (sometimes technical) details.

The non-climate scientists provided the following feedback on learning about climate science through FRACTAL:

- The group included two opposing perspectives; one group member felt that contact with climate scientists has been limited and consequently, not enough opportunities to learn from this group have been provided. Another perspective offered was that much learning has occurred through the proximity to the climate scientists during FRACTAL Learning Labs.
- Learning about seasonal vs. climate changes
- Narratives present different scenarios, all of which could be experienced.
- More about climate uncertainty; what this means and how scientists are trying to deal with different lines of evidence.
- It's a challenge to introduce climate science into decision making!

The second breakout group session was focused on understanding **what team members have learned outside the climate science discipline through FRACTA**L. Feedback from these discussions did, however, have strong ties to what has been learned about climate science.

The climate scientists presented the following points:

- Many cities are incredibly vulnerable to the effects of natural climate variability, before we even consider climate change.
- There's nothing like a good disaster to stimulate learning about how climate and society intersect.
- There are few entry points for climate information in current decision-making structures and processes.
- The narrative process has helped climate scientists learn a lot about things outside of their discipline; engaging with many different types of knowledge pushes them to understand other stressors.
- Many potential users of climate information are not sure what they need to make resilient decisions; this is evident in Europe and Africa.
- Climate is not the main stressor in cities; this was learned through many conversations when the climate cluster was stuck for a long time.
- Language is a big challenge, especially when trying to work across disciplines that include quite complicated concepts.

The non-climate scientists presented the following points

- Using climate information in city decision making is challenging; the learning labs are helping to facilitate discussions about this.
- Other disciplines are very important when working towards understanding vulnerabilities such as governance theory. However, learnings that have been achieved through these academic disciplines are difficult to apply in the 'third space' of the learning labs, during which the reality of power and dynamism in the city becomes overwhelming sometimes. There is a need to find a common point at which academics and practitioners talk to each other, setting the same goals.
- Climate information can be very scientific and difficult to use.
- Stakeholder engagement and ongoing interaction is very important to support translating science into everyday language.
- FRACTAL team members have felt very challenged through working in such a complex programme, which is sometimes difficult. This experience has, no doubt, helped us to learn so much.
- The concept of receptivity is important; instead of talking about entry points, we need to think about the fact that decision makers and researchers become receptive to each other's perspective and knowledge.

Wrap-up reflections

Reflecting on all of these points, the wrap-up discussion focused on the idea that: **only when one understands the detail of a socio-economic system such as a city (or part of it) does one begin to understand the value of climate science; where and when it is useful and usable. These systems need to be explored in enough detail to know where climate science fits in. As an example, the intersection of the recent drought in Cape Town and water management in the city; we can only begin understanding the impacts of the drought when we understand decisions related to water management.**

This begs the question; is there only one way of undertaking co-production of knowledge for climate resilience, at least in cities? (i.e. following these long, resource-intensive, emergent learning processes). As a FRACTAL team, it's hard to imagine how we would do it otherwise.