

COMMENTARY:

Adaptation tracking for a post-2015 climate agreement

J. D. Ford, L. Berrang-Ford, R. Biesbroek, M. Araos, S. E. Austin and A. Lesnikowski

A post-2015 climate agreement will require systematic approaches for tracking adaptation progress across Parties to the UNFCCC. A number of steps need to be taken to improve adaptation measurement and reporting.

Adaptation has become a cornerstone of international climate policy and is likely to figure prominently in a new global climate agreement¹. A key challenge facing the adaptation community will be to measure whether investments made in adaptation at the national level are reducing vulnerability, and whether new agreements in the global arena are translating to actual adaptation^{2–4}. It is thus of paramount importance to develop standards, methodologies, indicators and baselines for assessing progress towards the adaptation goals of a new agreement. We refer to such work as ‘adaptation tracking’, a subcomponent of Monitoring, Reporting and Evaluation (MRE) that seeks to systematically identify, characterize and compare adaptation across nations and over time. Surprisingly, there has been little consideration of how to track adaptation across Parties to the United Nations Framework Convention on Climate Change (UNFCCC), with most discussion on MRE taking place in the context of specific national work-streams (for example, National Adaptation Plans) or with regards to funding decisions (for example within the Adaptation Fund Board). It thus remains unclear how commitments to facilitate adaptation under a post-2015 agreement would be meaningfully tracked.

The inadequacy of MRE within the UNFCCC was acknowledged by the Adaptation Committee (AC) in its report to the nineteenth Conference of the Parties (COP) in 2013, and the Committee’s first workplan prioritizes stronger engagement with the challenges of monitoring adaptation across scales and levels of governance⁵. As the AC prepares its second workplan for 2016–2018, however, key questions remain about how to link MRE on individual adaptation activities with national-level assessments, or how

to define success in achieving national climate resilience⁶. In this Commentary, we identify and examine steps that need to be taken within the UNFCCC if adaptation is to be meaningfully tracked, beginning by outlining challenges facing the task of global-scale adaptation tracking.

Messiness of adaptation

The nature of adaptation complicates global-scale tracking efforts at three main levels. The first is conceptual. The overarching goal of adaptation is to reduce harm from current and projected climate risks, which could theoretically be measured with reference to averted future impacts. In reality, however, it will be nearly impossible to separate adaptation initiatives causally from other policies and processes because of their contributive effect (for example policies tackling underlying determinants of vulnerability including investments in education, poverty alleviation and healthcare)^{7,8}. Indirect measures for tracking adaptation are therefore needed, such as focusing on progress towards developing and implementing adaptation policies, where policy type and content can be compared with adaptation commitments and needs and monitored over time^{9,10}. Yet in developing such measures or proxies there is much debate about what actually counts as ‘adaptation’, arising from the indistinctiveness of the concept, lack of clarity in its usage and continuous rebranding of policies as ‘adaptation’¹¹. As such, there is limited agreement on what to track. For example, disaster risk reduction (DRR) is considered adaptation by some even if it does not explicitly consider future climate change impacts, whereas others have argued that adaptation is additional to existing DRR efforts and must include a strong focus on the long-term effects of climate change¹¹.

The second challenge is methodological, and concerns the need to develop approaches that can generate broad-scale insights for comparing adaptation across nations (that is, case comparison) and over time (that is, longitudinal assessment). There is plenty of qualitative evidence from small-*n* studies examining specific adaptation policies or programs funded by donors, governments or non-governmental organizations, documenting the experience of adaptation in specific locations^{12,13}. At a national level too, efforts have been made to describe and evaluate the adaptation landscape, including the development of indicators in some countries (for example the United Kingdom and Germany). Although these efforts are informative, to understand whether and how adaptation is taking place globally requires the development of approaches and indicators specific to this scale. MRE frameworks cannot simply be scaled-up, aggregated and meshed from different countries or scales because of differences in what is being measured and how¹¹.

The final challenge is empirical. To capture generalizable trends and patterns in adaptation, data sets need to be large and detailed enough to capture a range of adaptation experiences and outcomes; for case comparison and longitudinal assessment, adaptations need to be systematically documented according to standard guidelines; to underpin confidence they need to be comprehensive in geographical scope and content; for longitudinal assessment they need to collect regular data on adaptation; and they need to evolve as the need for specific types of adaptation actions changes¹⁴. Existing data on adaptation are, however, often limited, too broad, biased due to overemphasis on reporting success stories, or insufficiently tailored for adaptation tracking purposes.

Road to Paris

The difficulties surrounding adaptation tracking are thus considerable. But they are not insurmountable. Developing systematic and transparent approaches to this end will involve striking a balance between breadth and depth, and some degree of standardization, and as such may be challenged by those who see adaptation as a local issue. Yet adaptation is also a national issue², and global-scale adaptation tracking is necessary not only within the context of the UNFCCC. Tracking will open up new avenues for comparative enquiry and hypothesis testing, and will move scientific inquiry on adaptation further¹⁵. We propose the following key steps where action is required.

An operational definition of adaptation needs to be determined.

It has been argued that the definition of adaptation used by the UNFCCC is not sufficiently specific for operational clarity and consistency^{9,14}. For tracking purposes, criteria are needed on what is and what is not adaptation, with two dominant discourses offering different framings. A 'development-oriented' approach would focus on tracking policies that seek to reduce general vulnerability and increase overall resilience to both climatic and non-climatic risks¹⁶. This would have the benefit of documenting efforts to enhance general capacity to adapt, but risks capturing symbolic policies that contribute little to reducing climate risk. Alternatively, a 'climate-change-oriented' definition would focus on tracking policies that have an explicit, purposeful and substantial focus on responding to climate change impacts^{11,16}. This approach more clearly aligns with the UNFCCC but risks overlooking broader developments important for vulnerability reduction. In line with Agrawal and Lemos's¹⁷ proposed focus on 'adaptive development', we support middle-ground approaches that clearly and explicitly recognize the role of development as adaptation, while requiring minimum evidence of a climate change lens: we might pragmatically tackle this challenge by defining 'what is not adaptation' as a mechanism for exclusion, rather than tinkering with the boundaries of inclusion criteria.

Parties must decide what information needs to be tracked. Indicators need to be decided on that reflect substantive progress in achieving the overarching goal of the UNFCCC to facilitate adaptation to climate change. Documenting the adoption of adaptation policies and legislation across

nations, or monitoring commitments and disbursement of adaptation funding, offers one such approach^{18,19}. Metrics of this nature are insightful, but on their own are not necessarily indicative of meaningful adaptation. Monitoring and evaluating adaptation policies and programs offer an alternative and complementary approach. Preliminary frameworks have been proposed that could form the basis for developing indicators of policy content and process^{9,20–22}, although few have guided data collection, an exception being Lesnikowski *et al.*²¹ who develop a national-level adaptation index based on the breadth of adaptations reported and adaptation type (groundwork or action). Existing frameworks can provide a starting point for decisions within the UNFCCC on what kinds of metrics to track, although further research is needed to develop more substantive measures of adaptation progress for global-scale application.

An adaptation baseline is required.

A baseline is needed to characterize the state of adaptation at a specific point in time from which change can be measured. Depending on the approach, indicators to be tracked could include the number of adaptation policies, or funding allocated to adaptation activities, along with measures of policy content and process. Although some studies have characterized adaptation in particular regions, nations and sectors, tracking under a post-2015 agreement requires a uniform baseline from which consistent approaches and data sets can be used across nations. Before a baseline year is determined, however, key components of an adaptation tracking approach need to be resolved. An additional complexity, especially given the potential implications of the baseline for funding allocation and monitoring progress on commitments, is to avoid penalizing those who have been proactive in their adaptation activities.

Systematic reporting on adaptation is needed. Adaptation tracking requires information on adaptation to be collected across nations in a systematic, comprehensive, and consistent manner, at regular intervals dictated by timescales over which adaptation is to be monitored, and providing detail from which useful data on adaptation can be extracted^{2,23}. Such data sources do not currently exist across nations globally, although it is noteworthy that regionally there are a number of knowledge-sharing platforms on adaptation^{1,2}. The UNFCCC needs to develop robust reporting systems for cataloguing adaptations to support

adaptation tracking in a post-2015 agreement — a need recently acknowledged by the UNFCCC²⁴. This could be through an extended National Communication process with enhanced adaptation focus and more specific guidelines for adaptation content, or through specific reporting procedures to support tracking goals. We propose the latter, which would bring adaptation in line with mitigation, although it would entail additional reporting burden on Parties, with many low-income nations having limited data collection capacity^{23,25}.

The AC, as the overall advisory body to the COP on adaptation, has a central role in initiating discussion on adaptation tracking, and providing technical support and guidance to Parties. This needs to be prioritized in its second workplan for 2016–2018. In exercising this function, an important first step could be to organize a workshop and/or expert group to compile, review and examine approaches for adaptation tracking across nations, focusing specifically on the key steps profiled above, examining actions on adaptation MRE from smaller scales to identify transferable lessons, and providing guidance and recommendations to the Parties on what further actions are required. This need is pressing: if adaptation is to be addressed with the same level of priority as mitigation, there need to be appropriate tools, baselines, reference points and methods for tracking progress. □

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References

1. Helgeson, J. & Ellis, J. *The Role of the 2015 Agreement in Enhancing Adaptation to Climate Change* (OECD, 2015).
2. Magnan, A., Ribera, T. & Treyer, S. *National Adaptation is also a Global Concern*. IDDRI Working Paper No. 4/5 (IDDRI, 2015).
3. Ford, J. D., Berrang-Ford, L., Lesnikowski, A., Barrera, M. & Heymann, S. J. *Ecol. Soc.* **18**, 40 (2013).
4. Berrang-Ford, L., Ford, J. D. & Patterson, J. *Glob. Environ. Change* **21**, 25–33 (2011).
5. *Report of the Adaptation Committee, Subsidiary Body for Scientific and Technological Advice*. 39th Session (UNFCCC, 2013).
6. *Report on the Workshop on the Monitoring and Evaluation of Adaptation* (UNFCCC, 2014).
7. Brooks, N. *et al.* *An Operational Framework for Tracking Adaptation and Measuring Development (TAMD)* (IIED, 2013).
8. Adger, W. N., Arnell, N. W. & Tompkins, E. L. *Glob. Environ. Change* **15**, 77–86 (2005).
9. Biagini, B., Bierbaum, R., Stults, M., Dobardzic, S. & McNeeley, S. M. *Glob. Environ. Change* **25**, 97–108 (2014).

10. Reckien, D. *et al.* *Clim. Change* **122**, 331–340 (2014).
11. Dupuis, J. & Biesbroek, R. *Glob. Environ. Change* **23**, 1476–1487 (2013).
12. Lamhauge, N., Lanzi, E. & Agrawala, S. *Clim. Dev.* **5**, 229–241 (2013).
13. Brooks, N., Anderson, S., Ayers, J., Burton, I. & Tellam, I. *Tracking Adaptation and Measuring Development* IIED Working Paper No. 1 (IIED, 2011).
14. Ford, J. & Berrang-Ford, L. *Mittig. Adapt. Strateg. Glob. Change*, <http://doi.org/7z2> (2015).
15. Swart, R., Biesbroek, R. & Lourenco, T. C. *Front. Environ. Sci.* **2**, 29 (2014).
16. McGray, H., Hammill, A., Bradley, R., Schipper, E. L. & Parry, J. E. *Weathering the Storm: Options for Framing Adaptation and Development* (World Resources Institute, 2007).
17. Agrawal, A. & Lemos, M. C. *Nature Clim. Change* **5**, 185–187 (2015).
18. Fankhauser, S., Gennaioli, C. & Collins, M. *Clim. Policy* <http://doi.org/2px> (2015).
19. Townshend, T. *et al.* *Nature Clim. Change* **3**, 430–432 (2013).
20. Henstra, D. *Clim. Policy* <http://doi.org/7z3> (2015).
21. Lesnikowski, A. C. *et al.* *Glob. Environ. Change* **23**, 1153–1163 (2013).
22. Vogel, B. & Henstra, D. *Glob. Environ. Change* **31**, 110–120 (2015).
23. Lesnikowski, A. C., Ford, J. D., Berrang-Ford, L., Barrera, M. & Heymann, J. *Mittig. Adapt. Strateg. Glob. Change* **20**, 277–293 (2015).
24. *Report of the Ad Hoc Working Group on the Durban Platform for Enhanced Action* FCCC/ADP/2015/2 (UNFCCC, 2015); <http://go.nature.com/EnBFZf>
25. Otto, I. M. *et al.* *Nature Clim. Change* **5**, 503–505 (2015).

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COMMENTARY:

Planetary vital signs

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After Paris, policymakers will need new goals for protecting the climate. Science can help with a basket of measures because 'climate change' isn't just about temperature.

For too long, diplomats and scientists have been avoiding the need to take a fresh look at the goals for managing global climate change¹. Over the past decade, nearly all policy efforts have been unchanged in their focus on the goal of stopping warming at 2 degrees C above pre-industrial levels². Insofar as there has been much scientific discussion about setting goals, it has been to look at even less achievable, stricter standards, such as 1 degree or 1.5 degrees³. Actual progress in cutting emissions has been slow, a sobering fact that is unlikely to change — even with all the momentum generated by the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) to be held later this year in Paris.

Using temperature to set goals, although simple and intuitive, barely captures the range of real dangers that arise as the planet warms⁴. Average surface temperature, the standard measure, does not reveal the much larger amount of heat building up at various depths in the oceans⁵. Policymakers who are already planning for a warmer world are not worried principally by rising temperature *per se*; instead, they are increasingly focused on more tangible impacts such as rising sea level, extreme weather, damage to crops and other hazards all caused by the same physical processes that give rise to increased average temperatures.

Vital signs

A new list of 'planetary vital signs' is needed to help guide policymakers towards

realistic goals that also reflect the full range of dangers lurking with climate warming. Crafting better indicators is a task that must begin now, so that useful answers are ready when diplomats need them. Realistically, the diplomatic script for COP21 is already written, and there is no space for complex and indeterminate scientific debates at this late hour. But after Paris it will become clear that the goal of stopping warming at some pre-determined temperature may be helpful as a proxy for cumulated emissions but is only one crude measure of the planet's health. Politicians will need access to a wider range of vital signs to understand the full range of consequences of climate change and to measure practical progress in implementing policies. Over the next two years, the scientific community can organize a coherent suite of indicators.

There are many lists of indicators already. The Global Climate Observing System⁶ has identified several dozen essential climate variables that should be monitored in support of climate science. The US Environmental Protection Agency's list⁷ contains four indicators relating to greenhouse gases, four relating to oceans, six to weather and climate, six to snow and ice, five to health and society, and five to ecosystems. The United Nations' new sustainable development goals, to be adopted in September, include some measures linked to climate^{8,9}.

Creating indicators that are useful for policymakers requires a strategy that

integrates practical policy needs with the best science. It must include policy goals that reflect what policymakers actually control — and thus what they can manage. And it must begin with the climate impacts that the policymakers most fear — and thus where they must prepare for change. The left column of Table 1 offers an illustrative first draft. A high priority after Paris, one that requires a mandate from the Paris meeting itself, is to convene a process that would crystallize climate policy concerns into a manageable first column for Table 1.

Turning column 1 into a practical programme requires a careful assessment of what can be measured. In column 2 we show proxies for each of the phenomena that can be measured today. Some of these measures, such as temperature and sea level, have been mainstays of the climate policy debate. They have improved incrementally as scientists learn more about how to make reliable measurements and aggregate them into global indicators, such as in temperature¹⁰. Other indicators are more recent entrants — such as the incidence of extreme (three-sigma) temperature events^{11,12} and the reliable operation of the Argo float network that allows for systematic measurement of ocean heat content (OHC)¹³. Focusing on climate dangers that matter to people and policy could lead to persuasive indicators that reflect the incidence of heat stress¹⁴, exposures of populations¹⁵ and even the monetary cost of climate extremes.