



Science and the Sustainable Development Goals

Sir Peter Gluckman's address to the European Open Science Forum Manchester

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In my brief remarks about science advice for the Sustainable Development Goals and agenda 2030, I want to make five related points.

First (and arguably foremost) in my view, will be the importance of effective science advisory mechanisms at the *domestic* level. Let us not forget that the Sustainable Development Goals (SDGs) are challenges in which all nations must play a role, but those roles will always be mediated by individual domestic situations. When states and other actors recognise the evidence *for themselves* regarding these goals, then the goals become achievable. Science, especially social and environmental, is critical to all the SDGs and in many places much science and science-informed policy development is needed before meaningful implementable and scalable strategies are possible. Some of the SDGs require global or regional action; all require universal national action and all require a much closer link between science and policy communities.

It is thus self-evident that effective science advisory mechanisms will be needed at the domestic level for the SDGs to be achievable. And that needs access to both deliberative advice, often given by academies, but also informal advice of the nature that trusted advisors give to state leaders. Trusted evidence-based informal advice about how to use science is essential in a world of competing demands, complexity and urgency and where much of the science is both ambiguous and uncertain, and crossing between natural and social sciences. A comprehensive science advisory ecosystem includes both the internal mechanisms of trusted advice about science direct to the executive arm of government and the external deliberative independent mechanism of respected scientific academies. However, few countries (whether developed or developing economies) have both these mutually reinforcing components.

In addition to collective national action, the SDGs require global action through the engagement of the major international agencies. And here comes my second point. Even this organised international action is not likely to be effective without effective domestic science advice.

Let me explain this rather strong statement. To do so let me parse the concepts of science diplomacy. It effectively has two major dimensions. Firstly, there is science to advance national interests; most evidently this is in the form of science to support economic interests, trade and resource management, to project soft power and to promote bilateral relations.

Secondly, there is science to advance global interests – for example governance of the Antarctic and other ungoverned spaces, addressing global challenges such as climate change, zika fever and indeed the SDGs themselves. These two perspectives often do not align and this adds complexity to policy making and creates challenges for effective scientific input.

Let me parse this a bit further. Science to advance national interests on the global stage is dependent on domestic science advisory systems to make it accessible to non-scientists (i.e. diplomats and other national representatives in global contexts). But with respect to science to advance global interests the case is often being put by scientists themselves, scientific organisations and NGO advocates who are not engaged with a country's representatives and decision makers. Indeed, international agencies often have their own science advisory processes. In this, the perspective is arguably one of scientism, with less appreciation of the policy perspectives of national governments - and the question is, how to ensure that science can best exert influence on policy development, while still understanding the rights of sovereign governments to make their own decisions.

And so the complexities of the interaction between science and public policy are amplified in the international arena because most global agencies are ultimately responsive to national governments (all of which will be trying to advance their own interests) and jurisdictional override. Thus while science to advance global interests may be the ambition of many scientists and NGOs, global interests are more likely to be achieved when nations support global or regional goals because of enlightened self-interest.

My third point relates to the interaction between formal science and indigenous and local knowledge (ILK). Science is but one epistemology. We understand it as a set of internationally recognisable processes by which we can gain relative reliable knowledge about the world around us and within us. But what is considered 'knowledge' can be viewed differently by both politicians and the public. This is not to say that multiple anecdotes will ever amount to scientifically acceptable data, but it does highlight the need to be mindful of the place of indigenous and local knowledge. There are challenges in integrating those epistemologies that place societal values quite differently to formal science, but some form of reconciliation is necessary if we are to successfully address many global challenges.

In science the processes are designed to identify and minimise bias: in ILK beyond the obvious importance of trans-generational empirical observation, values, belief and knowledge are most often intimately intertwined. Thus the skills and teachings of what has been referred to as 'post-normal science' will become even more important to tackling so many needs identified in the SDGs.

The need to marry social sciences, humanities and the natural sciences is urgent, particularly if we are to gain necessary insight into the human dimensions of complex problems. It is not only technical knowledge that is needed. The hubris of western science needs to be tempered and we need to work at understanding that local tradition, community priorities, conditionalities and world-views matter as much as the science that is employed. When these clash with what science can offer, the dialogue needs to be patient and a true dialogue.

And my fourth point is derivative from the other three I have made. That is how we can collaboratively address the challenge of new technologies and issues of social license in relation to poverty alleviation and SDGs. The range of new technologies that could make a difference is enormous both in the life sciences and in the physical sciences. Most attention has focused on the life science technologies such as gene modification and now gene editing and meiotic gene drive, but it is here that science and deeply held world-views most often collide. But we also are starting to see concerns arise about physical technologies – what will be the impact of big data, the internet of things, of knowledge manipulation etc on societies. This is a whole topic in its own right – issues such as understandings of concepts of risk, precaution and innovation have become critical to national progress, but the impact of knowledge imperialism (with regards decisions (say) made in Europe or North America) which have global implications, will impact on how science can help advance the SDGs.

Science can easily become the battleground for values-based debates that are not about science. Rhetoric needs to be replaced by informed dialogue and that dialogue must be based in every society that must reach its own, hopefully, informed decisions. Discussion must not be shut down by extreme views; a Luddite approach is unrealistic, but equally so is an entirely technocratic (or scientist) approach.

Indeed, without innovation no progress is possible - but that innovation must be carefully chosen and adaptive management of innovation rather than ideologically driven extreme views will be needed. Such dialogue is already rather poorly done in advanced economies; perhaps we can all learn something about how it can best be undertaken collaboratively and meaningfully in LMICs.

The final point I want to make is, I hope, self-evident and needs no explanation. If we do not get beyond disciplinary silos and integrate the natural and social sciences, the SDGs cannot be achieved.

Achieving the SDGs creates some extraordinary stretches and high expectations. The appropriate use of science will be necessary to design and implement strategies to achieve them. Without attention to the five points just outlined, I suspect that progress will not match the enthusiasm with which the international community embraced these goals. A core focus of the new International Network for Government Science Advice (or INGSA), which I have the privilege to chair, is to assist in the promotion of a dialogue on these matters and in working with individuals and institutions to develop the capacity to support more effective use of science in policy formation.