Science-Based Solutions for Poverty Eradication and Sustainable Development: Science Academies working together to tackle SDGs 1 and 10

Beijing, 9-10 December, 2017

Abstract of the Presentations

Day 1 – What science can do to end poverty in all its forms everywhere

<u>Panel Discussion I: Developing new programs and identifying best policies and strategies to end poverty</u>

Wang Yi (CAS) - Pending

Ratemo Michieka (Kenya National Academy of Sciences) - Linkages between science academies, environment, and poverty reduction

The otherwise optimistic future outlook anticipated as Africa being a rising continent is threatened by a nexus of problems. Climate change has caused deficits in livestock and crop production. The alteration of the environment and its natural resources is impacting on human lives. Many countries particular in the tropics are endowed with immense natural resources that are not utilized for the benefits of the local communities. Hence, the notion of access to benefit sharing of those resources is void. Human settlements and ignorance have generated conflicts, migrations, disease epidemics, unemployment, and human suffering, which are related to environmental problems. The end result is poverty at regional and national levels.

There are three points of views of poverty in Africa. The first one includes a view on income. One is said to be poor when his/her consumption is less than the required basic needs. The second concern is the level of development within nations. There is a growing lack of resources for production to the extent that many people do not have access to adequate living standards. The third point of view is on the indicators of environmental problems. Human settlements in Africa is significantly correlating to the degradation of the environment, which includes pollution, land degradation, poor wastes management, diseases, poor hygiene, water issues, diseases epidemics, among others.

How can the national academies in each country assist in alleviating poverty through scientific management of the environment?

There is a growing concern on the inability to access basic, but essential goods and services. The situation is coercing the state of the environment, with for instance in the Sub-Saharan Africa 40% of arable land that is no longer able to support livestock and crop production. Consequently, this situation has caused 67% of food total loss. The ecosystem forests are suffering as well, with for instance 55% of forest in West Africa lost due to human's survival techniques.

While the population strived to use environmental resources for survival, the intensity of extraction and exploitation has been increasing from year to year. Not only the environment is deteriorating, but also the conditions of life have been terribly affected. The causes of numerous diseases are directly related to environmental pollution and degradation. This is where world academies must show prowess.

Preliminary researches conducted in local communities showed that there was a significant deterioration of living conditions in the Sub-Saharan African regions. The findings revealed declining of health, quality and quantity of food, and quality of education. These have been due to rapid population growth.

The impact of poverty in Africa does not adequately address the society's capacity to achieve a sustainable development, which may entail having some education, information, legal rights, and infrastructures. Achieving socially acceptable standard of livings requires the participation and involvement of all the related stakeholders. In this regard, the role of the science academies should be to advise and create policies that can be utilized by the local communities and national governments. The academies are the think-thanks of the relevant countries.

In order to implement the academies' actions, the education system should be reformed. Environmental sciences should be part of the school curriculum through basic science courses from lower levels, practical trainings related to sciences, and acculturation exercises. These resources and capacities will contribute enormously to changing of attitudes and practices with a view to transforming developing nations into a sustainable countries; thus reducing poverty. As the former President of South Africa, Nelson Mandela, said: "Poverty is not an accident...it is man-made and can be removed by the actions of human beings".

However, it takes government to eliminate poverty to its midst. Many countries have succeeded in this task by putting poverty evidence at almost zero. It was possible because of strong institutions put in place that significantly linked science and environment to the government tasks. The science academies must be integrated in the government bodies if developing nations are determined to eradicate poverty. The French government is for instance integrating scientists in its government bodies and allocating time and resources to science academies in order to totally eradicate the rampant poverty within its country. These efforts will place France into a higher level of industrialization.

Developing nations have a lot to gain in reforming their education systems by emphasizing science in environment. The continent still possesses enormous potential of natural resources and a huge human force. The linkage of science academies to making-decision strategies would alleviate the issues of health, population growth, food quality and quantity, and education: thus contributing to reducing poverty.

Panel Discussion II: Implementing social protection systems and measures covering the poor and the vulnerable

Liu Yansui (CAS) - Pending

Fernando Filgueira (Uruguay) - Pending

Li Xiaoyun (CAU) - Pending

Judith Teichman (Royal Society of Canada) - Poverty and Inequality Reduction as Politics: The Role of Consensus and Coalitions in Achieving Social Goals

This presentation focuses on the politics of poverty and inequality reduction and responds to the growing interest in international development circles in (re)-introducing the topic of politics to discussions of poverty and inequality reduction. Such an approach is particularly pertinent to this gathering since many among the scientific community may not have considered this aspect of the process. Politics may shape, in important ways, the manner and extent to which the scientific community is able to impact policies that are essential to both poverty and inequality reduction.

I take as my starting point the definition of politics advanced by a well-known political scientist, Harold Lasswell, who defined politics as "who gets what, when, and how." Understood in this way, politics may be just as important (or even more important) than the "right" policies— simply because without the "right" politics those good policies may never see the light of day.

The basic premise of this presentation is that government policies are important; policies can, indeed, make a difference as to how much poverty and inequality are reduced. However, there are also many important factors over which policy makers have no control: commodity prices and resources endowments immediately come to mind. What we do know is that political leaders are able to develop and implement policies, which, to varying degrees, have an impact on social outcomes. Hence, if progress is to be made in poverty and inequality reduction, political leaders must first and foremost have a firm political commitment to these goals. Of course, political leaders will not admit, especially with the international commitment to the Sustainable Development Goals, that they hold poverty and inequality reduction as low priorities, so the key question revolves around the extent of this commitment. Lack of full commitment on the part of political leaders is the first hurdle to clear on the road to successful poverty and inequality reduction.

Hence, the key question is this: How do we ensure that political leaders are, and remain, committed to poverty reduction. This is an ongoing problem because even political leaders, who may be initially committed to these social goals, can find their enthusiasm waning in the face of more powerful social groups (such as middle classes or business interests) who are less concerned about such issues. Political Science research shows that political leaders are far more likely to respond to the demands of those who are most organized (and are usually not poor).

What is required therefore, to keep political leaders on track, is a broad societal consensus that poverty reduction must be the main objective of government policy. There should also eventually be a broad societal consensus on how this is best achieved. You will note that I am not making a case that electoral democracy is a panacea. It can certainly play a role, and has in some cases, but there are also notable cases of authoritarian contexts (Taiwan, South Korea, China, come to mind), where economic growth has occurred alongside significant poverty reduction and low inequality.

While the election of leaders and parties concerned with issues of poverty and inequality can certainly help, it will achieve little if there is stiff opposition to a social agenda by important

social groups. Many electoral democracies in Global South countries face unrelenting problems of poverty and inequality. Many of these, of course, are problematic democracies with many democratic deficits. In these cases, powerful groups may block policies (such as tax increases) essential to fund social programs. Many electoral democracies, particularly in Latin America, face problems of political polarization over what kinds of economic and social policies are most appropriate; this inevitably produces political turmoil and a slowdown in economic growth. The latter interrupts or slows the rate of poverty reduction.

What I am saying here is somewhat at variance with much of the political science literature, which points to the role of social mobilization of excluded groups in pushing governments towards more inclusive policies. The argument presented by many political scientists is that this push from below will force governments to be accountable to the poor. However, there are many examples where social movements have been able to get poverty issues on the agenda (Mexico, comes to mind) but are not able to keep it there. These civil society organizations, therefore, need support, from a broader cross-section of society, particularly form non-poor groups. Whether authoritarian, problematically democratic, or substantively democratic, there must be an underlying societal coalition and consensus that poverty and inequality reduction are the main goal of public policy.

This is where the scientific community can play an important role. Everywhere, scientific communities have a great deal of gravitas; members of scientific communities may even have links with, or access to, the politically and economically powerful. Scientific communities everywhere can leverage their prestige and networks to raise societal awareness about the importance of both poverty reduction and low inequality. As members of the professional middle class they can help convince other groups in society that reducing poverty and low levels of inequality are good for everyone in society, including those who are better-off since low levels of poverty and inequality are associated with higher economic growth rates, lower crime, and lower criminal violence. Such a role might even necessitate involvement in politics.

Another important role that scientific communities can play is that of helping to build a national consensus on what particular policies are most suited to achieve good social outcomes. To do so, scientists will need to come to some sort of agreement among themselves. In many societies there are deep divisions about policy prescriptions, so this may not be easy. Probably the most contentious policy issue in many societies involves the role of the state and the market. Fortunately, the international consensus has moved from the earlier view that the market will solve everything towards a much more flexible attitude. Still, many societies remain deeply divided on this issue; it is a divisive issue that will need to be overcome if effective policies and their implementation is to be achieved.

One key reality that is important to bear in mind is that there is no magic bullet for overcoming poverty and inequality—contrary to what mainstream economics may have led us to believe over the last several decades that there is. About all one can say with any degree of certainty is that achieving poverty reduction and lowering inequality is a multifaceted project—the histories of countries that have achieved these positive outcomes shows that there have been many different paths and many different policies in combination. There are many ways to succeed and many ways to fail. Hence, the exact combination of policies will be context specific, depending upon what is politically feasible (the relative power of political forces), natural resources endowments, and experience with past policies. In choosing policy prescriptions, international development experts have been inclined to look for "evidence" of what works and what does not—oftentimes ignoring specific historical contexts and cultures. It is, however, important to

bear in mind that what "works" in one place may not have positive results in another. It is therefore crucial to distinguish between the ideal and the possible. There are often trade-offs between the best policy and what one can convince others to support. Obtaining buy-in from a broad cross section of society, and from the poor themselves, is crucial. In short, superb innovative solutions must have societal support.

Finally, much has been said about the centrality of the "governance" issue. It is commonplace to hear, particularly from the World Bank, that efforts at poverty reduction are blocked by corruption and lack of accountability because resources that would otherwise go to poverty reduction are being wasted. Certainly, it would be better if government leaders and institutions were more accountable. Helping to build a cross-national consensus on governance issues is another role that the scientific community could play. However, I would also like to suggest that focussing on governance issues (particularly the development of new laws and institutions of accountability) is also no panacea. This is because, as some of the most recent literature suggests, the factors subverting accountability can arise from deeper underlying processes, such as high levels of political and socio-economic inequality, deep societal and political divisions, and poverty and deprivation.

What is key is remaining flexible and advancing on many fronts at the same time. It is important to remember that sustainable poverty reduction takes time. It is intertwined with long-term historical processes; hence, it will not be overcome with short-term solutions. The scientific community has a crucial role in this long-term process.

Key Lecture: Rights to development and poverty reduction: Can science be of any help?

Yousuf Maudarbocus (Mauritius Academy of Science and Technology)

1.   Rights to Development and Poverty Reduction

1.1   Universal Declaration of Human Rights

Having access to basic human needs is a legitimate right of every human being. This important concept is embodied in the Universal Declaration of Human Rights (UDHR), which was proclaimed by the United Nations General Assembly in 1948. In fact, Article 25 if this Declaration clearly states that:

"Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services and the right to security in the event of unemployment, sickness, disability, widowhood, old age and other lack of livelihood in circumstances beyond his control."

It is therefore a matter of grave concern that, several decades after the Declaration of Human Rights, more than a billion individuals are still living in abject poverty. According to World Bank sources in 1999, almost three billion people – almost half of the world's population - lived on less than two dollars a day. In the same year, it was estimated that 1.5 billion people met Robert McNamara's definition of absolute poverty: "a condition of life so limited by malnutrition, illiteracy, disease, squalid surroundings, high infant mortality, and low life expectancy as to be beneath any reasonable definition of human decency".

This situation was still more disturbing when it was realized that 30 million people died of hunger every year and 800 million suffered from malnutrition, in spite of the fact that, according to the

Institute of Food and Development Policy, there was enough food produced in the world to supply each citizen with at least 2,700 calories per day.

1.2   Millenium Development Goals (MDGs)

It was against this background that the United Nations adopted the Millenium Development Goals (MDGs) in year 2010 and established 8 international development goals for the year 2015.

Goal 1 was to eradicate extreme poverty and hunger and the target was to halve the proportion of people with an income of less than 1 USD per day by 2015. According to the UN's final report, the MDGs have driven the largest anti-poverty movement in history and brought more than a billion people out of extreme poverty. However, it is generally recognized that the world remains deeply plagued by inequality. As the then UN Secretary-General so aptly put it:

"The MDGs helped to lift more than one billion out of poverty, to make in-roads against hunger, to enable more girls to attend school than ever before and to protect our planet….. Yet for all the remarkable gains, inequalities persist and progress has been uneven."

Between 1990 and 2015, the proportion of undernourished people fell from 23.3% to 12.9%. Current estimates suggest that around 800 million people are undernourished – the overwhelming majority in developing regions.

1.3   Sustainable Development Goals (SDGs)

In spite of great strides towards poverty alleviation as a result of the MDGs, more than 800 million people were still living in absolute poverty in the year 2015.

Establishing the post-2015 goals was an outcome of the Rio+20 Summit in 2012, which mandated the creation of an Open Working Group (OWG) with a Post-2015 Development Agenda as a successor to the MDGs. On 19 July 2014, the OWG forwarded a proposal for the Sustainable Development Goals (SDGs) to the UN General Assembly. The proposal contained 17 goals with 169 targets covering a broad range of sustainable issues, including ending poverty and hunger. The final document was adopted in September 2015.

Goal 1 of the SDGs is "to End Poverty in all its Forms – Everywhere". The target is to reduce by at least half the number of people living in poverty and to eradicate extreme poverty (people living on less than USD1.25 per day) by 2030.

1.4   Definition of Extreme Poverty

For the purpose of the SDGs and for the sake of standardization, a person living on less than USD1.25 per day was defined as a person living in extreme poverty. However, it is a fact that what can be purchased with USD1.25 differs from country to country.

In general, it is important to address the following issues in order to find a sustainable solution to poverty alleviation:

a.   to ensure adequate nutrition for the people, which includes sufficient food production;

b.   to tackle the problem of health;

c.   to provide sufficient and clean potable water;

d.   to ensure the provision of appropriate and sufficient energy, including electricity, to remote villages;

e.   to provide proper and relevant education to the poor;

f.   to provide better communication facilities;

g.   to minimize the adverse impacts of natural disasters; and

h.   to address the issue of climate change.

2.   Can Science Play a Role in Poverty Reduction?

The answer is YES and very much so. Science is already playing a major role in poverty alleviation, but there are several new avenues which can be explored.

In fact, science can be used and is already being used to boost agricultural productivity, provide means to generate energy cheaply, fight diseases and reduce child mortality, improve the quality of drinking water and promote mobile communications.

2.1   Nutrition and Food Production

Improvements in agricultural technology, brought about by the Green Revolution in the 1960s, staved off famine and raised the income of poor farmers in Asia, more particularly in China, Indonesia, India, the Philippines, Vietnam and Cambodia. The production of high-yielding varieties of rice and wheat helped in the fight against hunger, malnutrition and poverty.

Nowadays, biotechnology, molecular biology and genetic engineering have greatly and effectively supplemented conventional breeding approaches in enhancing yield, productivity and sustainability. Improved rice grains have also been produced genetically to boost the supply of iron and vitamin A in the human diet.

Nuclear techniques are also being used for mutation breeding. The seeds are subjected to gamma irradiation and a selection is effected following field trials. This method has been used to produce higher-yield sorghum in Mali, better varieties of tef in Ethiopia and rice in Tanzania, and disease-resistant coconut in Ghana, amongst many others. Various crops which are more suited to the semi-arid regions of Africa have also been produced by mutation breeding using nuclear methods.

The eradication of the tsetse flies in Zanzibar by the Sterile Insect Technique (SIT) has often been hailed as a major achievement and a huge step towards the alleviation of poverty in that small island. The tsetse flies cause a disease known as trypanosomiasis in cattle and sleeping sickness in man. Their eradication led to a significant increase in cattle production and a corresponding improvement in the living condition of the people. New breeds of cattle which could not survive before were also introduced.

Modern machines, improved irrigation techniques, improvement in soil fertility and new seed varieties continue to contribute towards improved and sustained agricultural production in developing and developed countries alike.

2.2   Disease Control and Poverty Alleviation

Poverty and ill-health are inextricably linked. Poverty is both a cause and a consequence of poor health. Several studies have shown that improvements in health contribute significantly to economic growth.

Neglected tropical diseases affect almost one billion people, almost all in the poorest and most marginalized communities. Numerous attempts have been made to eradicate communicable

diseases, mainly through widespread vaccination efforts. However, so far, only one human infectious disease, namely smallpox, can be considered to be universally eradicated, Global campaigns to eradicate other diseases such as polio, yellow fever and malaria, have met with some degrees of success but have not been completely successful. It has now become necessary to look at innovative ways to tackle disease eradication. As an example, following the successful utilization of the sterile insect technology (SIT) to eradicate the tsetse fly on Zanzibar Island, the same nuclear technique is being investigated by the IAEA to eliminate the mosquitoes which act as vectors to transmit malaria.

During the past decades, considerable progress has been made through the production of antibiotics and advances in medical technology to cure several diseases. However, a cause of concern is the development of new strains of diseases which are resistant to available antibiotics mainly due to the over utilization of the latter. Special efforts should be devoted to find a solution to this problem.

Further to global efforts, special attention should be given to control the diseases which are prevalent in poor regions.

2.3   Provision of Clean Potable Water

It has been estimated that more than 660 million people live without access to safe water and about 2 billion live without adequate sanitation.

Poverty is linked to both quantity and quality of water. Agricultural production in sufficient quantity to meet the needs of the people is largely dependent upon the availability of water. Especially in arid and semi-arid regions, it is important to identify additional potential sources of water, e.g. in aquifers. Isotopes are already being used as tracers to study the charge and recharge mechanisms of aquifers in several regions. These studies have to be extended and new methods have to be identified to assess the availability of water resources that can be exploited.

Access to adequate and sustainable sources of clean water is crucial to poverty reduction. Water-bourne diseases, linked to lack of access to adequate quantities of safe water and basic sanitation, are endemic in many regions.

Apart from the commonly utilized ways to purify water, specific techniques are being developed to deal with specific problems prevalent in certain regions. For example, arsenic is a major source of pollution in several countries, including Bangladesh, China, India and Nepal. One measure to improve the quality of drinking water in these regions was initiated at Rice University in the US by employing nanoparticles of magnetite, the magnetic form of iron oxide. These particles readily bind to arsenic in water and can be removed using a magnet.

2.4   Provision of Energy, including Electricity, to Remote Villages

It is estimated that 1.6 billion people, one-quarter of the world population, have no access to electricity. Four out of five people without electricity live in rural areas of the developing world, mainly in South Asia and sub-Saharan Africa.

Lack of electricity exacerbates poverty and contributes to its perpetuation, as it precludes most industrial activities and the jobs they create. Electric light extends the day, providing extra hours for reading and work. Refrigeration allows local clinics to keep needed medicines on hand.

In many developing countries, expanding the national grid to remote villages is far too expensive to be considered. Thus, rural electrification has to rely on decentralized units and renewable

energy technologies are quite appropriate and have a crucial role to play to that effect. A lot of progress has been made in recent years with regard to the efficiency and cost effectiveness of electricity generation from solar power and wind. More work has to be done with regard to other potential sources of energy, including geothermal and the ocean.

2.5   Science Education for the Poor

The lack of learning opportunities is both a cause and an effect of rural poverty. Hence, education and training strategies need to be integrated within all aspects of sustainable rural development.

Educating children is widely considered to be the best way of lifting communities out of poverty. In particular, exposure to basic science can make students acquire skills that can make them self-reliant and contribute to the economic development of their society. Moreover, an appropriate science education can go a long way towards a better understanding of health issues, agricultural production, communication facilities and other factors which can contribute towards poverty alleviation.

2.6   Better Communication Facilities for Rural Areas

The advent of satellite communication and mobile telephones has greatly improved the accessibility of information to poor rural communities. Mobile phones contribute to reduce poverty and improve rural livelihoods by expanding and strengthening social networks, increasing people's ability to deal with emergencies, cutting down travel costs, reducing cost of doing business and generally amplifying efficiency of activities. In the absence of a structured approach, progress has been rather slow. However, this can be easily remedied through an improvement in political will as the cost involved is not expected to be exorbitant.

2.7   Minimizing the Adverse Impact of Natural Disasters

Natural disasters such as tropical cyclones, floods and earthquakes are widely acknowledged to affect disproportionately the poorest communities compared to communities of higher development status. Recurrent events at times increase the poverty levels to such an extent that many households are unable to break out of the poverty cycle.

Science and technology help us to understand the mechanisms of natural hazards of atmospheric, geological and hydrological origins to enable us to take appropriate adaptation measures. Although it is not possible to prevent an earthquake or a cyclone from occurring, it is possible to apply scientific knowledge and technical know-how to increase the earthquake-resistance and cyclone-resistance of buildings and bridges, to issue early warnings and to organize proper community response to such warnings.

2.8   The Issue of Climate Change

Climate change is complicating efforts to reduce poverty. The biggest impact of climate change could be in food and water shortages.

As people already living in poverty lose their sources of food, fuel, shelter and income, their poverty deepens.

Science is already playing a major role with regard to both mitigation and adaptation measures to counteract the effect of climate change.

3.   Concluding Remarks

Science has a major role to play to reduce poverty worldwide. Many of the causes and effects of poverty are interlinked. For example, lack of water has a major impact on food production and nutrition and contaminated water is one of the major causes of diseases in poor rural areas.

It is therefore necessary to have a well-structured integrated approach to use science and technology to tackle the problem of poverty. International organizations, national governments, universities and research institutions, non-governmental organizations and the media should all be involved in a coordinated approach to reduce poverty worldwide. IAP, regional networks of science academies and national science academies are in a uniquely favorable situation to play this coordinating role.

*****

Day 2 – What science can do to reduce inequality within and among countries

Panel Discussion IV: Foster equal opportunities and develop programs to empower the poor

Wang Xiaoyi (CASS) - Pending

Aishah Bidin (Academy of Sciences Malaysia) - SDGs, reducing inequalities and human rights

In recent years, international human rights tribunals and other bodies have identified ways that deprivation of basic needs due to poverty , inequalities and discrimination can interfere with the enjoyment of human rights, and have clarified that States have obligations to protect human rights against such interference. The SDGs were developed out of far more participatory and global process than the Millennium Development Goals (MDGs) and have a broader coverage of topics and targets. The influence of human rights advocates could be seen in the acknowledgement of rights throughout the text of "Transforming Our World: The 2030 Agenda for Sustainable Development". Most of the 17 new Sustainable Development Goals (SDGs) and targets echo the goals and targets in the Millennium Development Goals (MDGs) framework. SDG 10 which focus to reduce inequality within and among countries is, however, completely new. The idea that the global community should work together toward equality had no part in the MDG framework, which focused on reducing poverty rather than making a more equal world. From a human rights perspective, the inclusion of the new SDG on reducing inequality is a great step forward. The SDGs are inextricably linked to human rights through the following goals namely the Goals concerning economic, social and cultural rights: such as poverty (Goal 1), food security and improved nutrition (Goal 2), health and well-being (Goal 3), quality education (Goal 4), and water and sanitation (Goal 6); all of which are enshrined in the International Covenant on Economic, Social and Cultural Rights (ICESCR). Further goals concerning civil and political rights which include, a goal on reduced inequalities (Goal10) and accountable and inclusive institutions and access to justice for all (Goal 16). This goal touches on important human rights standards and principles, for example including targets on access to information and protecting fundamental freedoms; participation in decision making; non-discriminatory laws and policies; and access to justice. The need to address growing inequalities within and between countries has been repeatedly identified as a key priority, by states and civil society alike, throughout the process of formulating the SDGs. Such a distribution of wealth and other economic and social outcomes cannot be consistent with the Universal Declaration of Human Rights proclamation that "all human beings are born free and equal in rights and dignity."

This paper examines SDG 10 on reducing inequality from a holistic human rights perspective by examining the concept of equality and non-discrimination within the context of international human rights law.

Panel Discussion V: Improving Scientific Input to Promote Human Development

Julian May (ASSAf - Standing Committee on Science for the Reduction of Poverty and Inequality) - Approaching food security as a common good: 'nourish to flourish' in the Western Cape, South Africa

The analysis of food security has been accompanied by a profusion of theoretical concepts, borrowed from diverse disciplines, and then employed to describe its attributes and to identify policy responses. Without agreement as to the nature of the problematic, conceptual confusion follows, along with solutions that are opportunistic rather than those that may have a lasting impact. An analysis of the underlying political economy of food security reveals it to be a public good produced from a complex system in which problems are ill defined and the solutions uncertain. Moreover, while food security is a human right, and thus potentially a global public good, food itself is a commodity, mainly privately produced and acquired. Food security is thus argued to be common, complex and wicked. In such circumstances, policy makers may retreat to responses based upon their bounded rationalities and opt for interventions that are conspicuous, but sub-optimal in their use of resources, achieve little and carry significant negative externalities. However an approach informed by social-ecological systems framework, successfully applied to similar collective action problems, improved the design, implementation and impact of policy in the Western Cape province of South Africa.

The food security and nutrition strategy of the Western Cape Government provides a case study of where this problematique has been used to develop and implement policy. Food security is enshrined as a basic human right in South Africa's Bill of Rights, and the right to food for all people and the right to nutrition for children are set out in South Africa's Constitution in Sections 27(1)(b), 27(2) and 28(1). Food security is also an explicit goal of South Africa's National Development Plan to 2030 (NDP), requiring deliberate action to address food insecurity through all tiers of government.

South Africa is considered food secure at the national level and consistently exceeds the dietary needs of its population, some 58 million people in 2018 (FAO, 2017). Despite this, household food insecurity in South Africa is high when compared to countries of similar economic development. In 2015, 25 percent of the population lived below the national food poverty line (Stats SA, 2017a). In 2016 South Africa's Demographic and Health Survey (DHS) reported that 27 percent of children under the age of 59 months were stunted (Stats SA, 2017b). At the same time, the DHS shows that 68 percent of adult women and 31 percent of men are considered to be either overweight or obese. This high prevalence of overweight and obesity has translated into high prevalence of diet-related non-communicable disease (MRC, 2013).

Despite the Western Cape's comparative prosperity and its well-established food system, the prevalence of the indicators of malnutrition among its population of 6.5 million are similar to national trends. The Western Cape Government (WCG) recognised the urgency for action and in 2014, set out to develop a food security strategy to complement its Provincial Strategic Plan. This strategy had to align with a National Policy on Food and Nutrition Security gazetted in 2014, as well as with other national policies such as those concerning land, water, health and

sanitation. The process required dialogue and co-design between multiple agents and bodies of knowledge, as well as between multiple rationalities and multiple levels, a feature identified in other attempts to co-design policy (Himanen et al, 2016).

The provincial government recognized its limited mandate and capabilities in regard to improving food security. Making use of an existing agreement with the Cape Higher Education Consortium (CHEC), a network for collaboration between the four universities of the province, research reports were commissioned to provide an information base (CHEC, 2012; WCG, 2014a; WCG, 2016a). These in turn recognised the complex nature of the food system and the nature of food security as a common good.

These reports informed stakeholder workshops conducted during 2015. The process was based on the SES framework and entailed identifying actors in the private, public and civil society sectors involved in governance, resources systems that influence food security, and the potential feed-back processes in the province. The deliberations of these workshops fed into a draft strategy document approved by the provincial cabinet in 2016 for public comment (WCG, 2016a). Parallel processes took place in other systems related to food security including health, governance and agriculture (WCG, 2014b; WCG, 2015; WCG, 2016b;). Following comment, a non-government organisation, the Southern African Food Lab (SAFL) specialising in partnering, was commissioned to convene additional groups of stakeholders. The purpose of these meetings was to develop projects to be implemented as partnerships between government and other actors in the local food system (SAFL, 2018; Krige, 2017). The first such partnership was allocated funding in the provincial Medium Term Budget Policy Statement released in late 2017 while new initiatives to build further partnerships are in progress (WCG, 2017a: 18; AgriOrbit, 2017). The strategy, known as "Nourish to Flourish" is now part of provincial government policy (WCG, 2017b).

Ten actions were important in the eventual acceptance of the strategy for joint action by the public and private sector, and civil society.

1.   Identifying and convening a broad spectrum of the actors involved, some of whom had to be first constituted as collective agents;

2.   Workshop processes that sought a shared understanding of the problems identified, and co-production of solutions being proposed. This recognised when solutions could result in non-cooperation or contestation;

3.   Visual graphing including placing solutions on a continuum of good to bad; identifying who would benefit, including free riders and those who might bear costs without garnering any benefits;

4.   Establishing which problems were symptoms of which other problems, or were problems arising from previous attempts to find solutions. This also meant dealing with any unresolved culpabilities that remained from these attempts;

5.   Using the workshops to list multiple narratives and explanations of problems, identifying for whom the explanation held, and the implications of this;

6.   Providing an extended period for partnering beyond the workshops to establish processes, procedures and actions before assigning responsibilities. This included establishing a regulator in the form of a directorate within the WCG, willing to span boundaries while providing oversight and enforcing stopping rules;

7.   Though-out the process, providing opportunities to agree on ways to check and report on the anticipated and unanticipated outcomes of the solutions being proposed. This explicitly included those affecting common property resources;

8.   The inclusion of reflexive processes through which the problems, solutions and impacts could be regularly revisited, as well as a means to facilitate the transferability of solutions to new problems that while unique, have familiar attributes. This is on-going (WCG, 2018).

9.   Establishing a credible ombudsman in the form of the SAFL to address contestations;

10.   Finally, and still in progress, accepting and assigning duties and culpabilities for the provision of food, food security and nutrition, including the positive and negative externalities that follow, including further mechanisms for recourse, oversight and insurance.

The on-going implementation of 'Nourish to Flourish' may require new forms of innovative governance not yet in place (Smith and Thomasson, 2016). Further, if this experience is to be transferred to other contexts, their configuration will differ according to the tiers of government involved. It is also likely that some of the partnerings will be difficult and will entail the management of disagreement and conflict before the desired prosocial outcomes can be achieved (Powell et al, 2017). Finally, future dialogue will not necessarily be initiated by the public sector and some engagements may arise from assertive action on the part of consumers and civil society following the realisation that they hold rights for which others bear duties.

'Nourish to Flourish' is only a single step toward the larger task of replacing a food system in which no one is in control with one that is polycentric.   Nonetheless, the horizontal interactions that took place between diverse actors in the Western Cape may result in the better-coordinated system with better-distributed outcomes envisaged by Ostrom (2000: 152).

Peter Fritz (Leopoldina Academy/ IAP-Research Project "Improving Scientific Input to Global Policymaking: Strategies for Attaining the Sustainable Development Goals") - Carnegie projects on global and regional policymaking

 In partnership with the Institute for Advanced Study (Princeton), IAP-Research has embarked on two three year projects (2016-2019), both funded by the Carnegie Corporation of New York: one designed to engage IAP members and the growing number of young academies globally on the Sustainable Development Goals (SDGs) agenda, and the other engaging its African senior and young academies on regional policymaking in Africa.

Both projects are addressing some of the barriers to global and regional engagement and developing resource materials to help the academies and their members, so that their strengths as foci for scientific excellence nationally, regionally and globally can be better applied to meet policy challenges.

Both IAP projects are experimental in nature and draw on a 2016/7 survey of 88 academies (senior and young; science, medicine and engineering) regarding engagement with the UN (all members) and African Union (AU) (African members only), and existing scholarly knowledge on the challenges they seek to address. To the survey responded 57 out of 85 senior academies of science, medicine or engineering and 30 young academies; plus the GYA.

Project 1: Improving Scientific Input to Global Policymaking: Strategies for Attaining the Sustainable Development Goals

In response to the findings of the academies' survey, this project has focused on a short guide to the SDGs for the academies, setting out why, how and where they could add value. This document will be published/distributed shortly.

Furthermore, there will be ongoing outreach: speaking to networks of academies to raise the profile of this work and encourage them to be more proactive in national and regional implementation of the SDGs.

A key part of this effort will be four regional meetings, developed in partnership with IAP's regional networks – AASSA, EASAC, IANAS and NASAC – and designed to raise the profile of the SDGs, share national experiences and build working links, for example with the UN Regional Fora on Sustainable Development.

Project 2: Harnessing science, engineering and medicine to address Africa's challenges

A work programme is underway, focusing on:

(a) exploring opportunities for more active and effective engagement at the national, regional and continental level – including building links with AU, NEPAD and Regional Economic Communities (RECs); most recently this included participation as invited guests to the African Union's Monitoring and Evaluation Committee for its continental STI plan;

(b) funding four regional grants to stimulate regional cooperation of academies, senior and young, and develop new conversations and new partnerships with national, regional and pan-African bodies;

The four grants funded were led by the Moroccan Academy (wealth creation); Nigerian Young Academy (young women scientists); South Africa Young Academy (food security); Uganda Academy (health)

(c) developing a three-tiered programme of work engaging African diaspora (short, medium and long-term strategies);

(d) developing a programme of work on science leadership, informed by participation at the World-Wide Meeting of Young Academies in July 2017;

To conclude, engaging the academies nationally and regionally is critical to both of these projects. The Project Secretariat has been providing updates to the quarterly IAP e-bulletin and the IAP Annual report 2016 (in progress), as well as updating the project web pages on the IAP-Research website. Any suggestions by the IAP Board for engaging membership more effectively are welcomed.

T Elliott, IAP Project Director and P.Fritz, member of WGs.

Key Lecture: Is it possible to reverse the increasing trends of poverty? How Science can help?

Elisa Reis (Brazilian Academy of Sciences) - Science and Social Responsibility: The Challenge of Eradicating Poverty

One may say that science practitioners implicitly aim at social betterment but making it explicit contributes to add value to knowledge production. While we know pretty well that the value of science lies in its social contribution, it is worth to have it in mind as we devise research agendas, set priorities, identify knowledge gaps, project synergies, etc. Indeed, our scientific work can

become more valuable if we make a concerted effort to better contribute to attain social goals. The concerted effort of the scientific community to contribute to the attainment of the Sustainable Development Goals clearly shows this, and IAP initiatives along these lines constitute significant steps. In the specific case of SPEC, goals 1 and 10 are the major targets. Indeed, aiming at poverty eradication (goal 1) we necessarily have to take into account the reduction of inequality (goal 10). If we want to effectively put science to work for fighting poverty we also have to find ways to reduce the huge gap between the bottom and the top of the social pyramid.

I side with Stephen Hawkins when he states plainly that social inequality is the major danger the world currently faces; that science must engage in the fight for less inequality; and that the defense of "non-contaminated knowledge", is conformism and opportunism. (S.Hawkins, The Guardian, December 2016). To meet the challenge of social relevance does not mean that only those directly involved in policy decisions are really qualified. Our task involves providing learned and responsible information available to those who legitimately control policy resources, but also speaking out when the information we provide is disregarded.

Aligned with the above concerns, a large group of scholars from social science disciplines and the humanities set to themselves to produce an International Panel on Social Progress. The Panel counts with an advisory board chaired by Professor Amartya Sen, a large scientific council, and a steering committee. The management of the Panel is chaired by people at the Collège d'Etudes Mondiales (Paris) and at Princeton University. IPSP initiatives initiated in 2015 and produced a three volumes report to be published by mid-2018 (Cambridge University Press, forthcoming). My purpose here is to present IPSP -- its composition, structure, major objectives, etc. – stressing its affinities with the SDGs, calling attention to the crucial need for interaction with scientists beyond the social disciplines, and invite SPEC members to consider possible forms of collaboration.

As shown in IPSP website (www.ipsp.org), we are around 300 scholars from all social sciences and from the humanities, from all continents, working together with the following objctives:

* Comprehensive coverage of the multiple dimensions of social progress

* Make up-to-date social science more accessible and relevant

* Feed social actors and citizens with ideas about possible futures, influence public debates

* Raise interest in social justice and long-term prospective among thinkers and actors

My presentation will expose the Panel 22 chapters approaching a large number of issues grouped on general topics: socio-economic transformations; political regulation, governance and societal transformations; transformations on values, norms and cultures. The departure point is a broad assessment of humanity conquests in terms of material resources, health, life expectancy, literacy, etc. and an inventory of negative aspects confronting society such as poverty, increasing inequality, terrorism, and spatial dislocation. Taking into account this paradoxical reality the Panel proceeds to map out in great detail causes and consequences of major problems, conditions and obstacles to overcome them, future scenarios as well as alternatives to secure a more just world.