



Statement of the Joint PAS/PASS Workshop on Sustainable Humanity, Sustainable Nature: Our Responsibility



Stabilizing the Climate and Giving Energy Access to All with an Inclusive Economy

Humanity has entered a new era. Our technological prowess has brought humanity to a crossroads. We are the inheritors of two centuries of remarkable waves of technological change: steam power, railroads, the telegraph, electrification, automotive transport, aviation, industrial chemistry, modern medicine, computing, and now the digital revolution, biotechnologies and nanotechnologies. These advances have reshaped the world economy into one that is increasingly urban and globally connected, but also more and more unequal.

However, just as humanity confronted “Revolutionary Change” (*Rerum Novarum*) in the Age of Industrialization in the 19th century, today we have changed our natural environment to such an extent that scientists are redefining the current period as the Age of the Anthropocene, that is to say an age when human action, through the use of fossil fuels, is having a decisive impact on the planet. If current trends continue, this century will witness unprecedented climate changes and ecosystem destruction that will severely impact us all.

Human action which is not respectful of nature becomes a boomerang for human beings that creates inequality and extends what Pope Francis has termed “the globalization of indifference” and the “economy of exclusion” (*Evangelii Gaudium*), which themselves endanger solidarity with present and future generations.

The advances in measured productivity in all sectors – agriculture, industry and services – enable us to envision the end of poverty, the sharing of prosperity, and the further extensions of life spans. However, unfair social structures (*Evangelii Gaudium*) have become obstacles to an appropriate and sustainable organization of production and a fair distribution of its fruits, which are both necessary to achieve those goals. Humanity's relationship with nature is riddled with unaccounted for consequences of the actions each of us take for both present and future generations. Socio-environmental processes are not self-correcting. Market forces alone, bereft of ethics and collective action, cannot solve the intertwined crises of poverty, exclusion, and the environment. However, the failure of the market has been accompanied by the failure of institutions, which have not always aimed at the common good.

Problems have been exacerbated by the fact that economic activity is currently measured solely in terms of Gross Domestic Product (GDP) and therefore does not record the degradation of Earth that accompanies it nor the abject inequalities between countries and within each country. The growth in GDP has been accompanied by unacceptable gaps between the rich and the poor, who still have no access to most of the advancement of the Era. For example, about fifty-percent of available energy is accessed by just one billion people, yet the negative impacts on the environment are being felt by the three billion who have no access to that energy. Three billion have so little access to modern energy that they are forced to cook, heat and light their homes with methods dangerous to their health.

The massive fossil fuel use at the heart of the global energy system deeply disrupts the Earth's climate and acidifies the world's oceans. The warming and associated extreme weather will reach unprecedented levels in our children's life times and 40% of the world's poor, who have a minimal role in generating global pollution, are likely to suffer the most. Industrial-scale agricultural practices are transforming landscapes around the world, disrupting ecosystems and threatening the diversity and survival of species on a planetary scale. Yet even with the unprecedented scale and intensity of land use, food insecurity still stalks the planet, with one billion people suffering from chronic hunger and another billion or so suffering from the hidden hunger of micronutrient deficiencies. Tragically, a third of the produced food is wasted, which as Pope Francis said is "like stealing from the table of the poor and the hungry".

In view of the persistence of poverty, the widening of economic and social inequalities, and the continued destruction of the environment, the world's governments called for the adoption by 2015 of new universal goals, to be called Sustainable Development Goals (SDGs), to guide planetary-scale actions after 2015. To achieve these goals will require global cooperation, technological innovations that are within reach, and supportive economic and social policies at the national and regional levels, such as the taxation and regulation of environmental abuses, limits to the enormous power of transnational corporations and a fair redistribution of wealth. It has become abundantly clear that Humanity's relationship with Nature needs to be undertaken by cooperative, collective action at all levels – local, regional, and global.

The technological and operational bases for a true sustainable development are available or within reach. Extreme poverty can be ended through targeted investments in sustainable energy access, education, health, housing, social infrastructure and livelihoods for the poor. Social inequalities can be reduced through the defense of human rights, the rule of law, participatory democracy, universal access to public services, the recognition of personal dignity, a significant improvement in the effectiveness of fiscal and social policies, an ethical finance reform, large scale decent work creation policies, integration of the informal and popular economic sectors, and national and international collaboration to eradicate the new forms of slavery such as forced labor and sexual exploitation. Energy systems can be made much more efficient and much less dependent on coal, petrol and natural gas to avoid climate change, protect the oceans, and clean the air of coal-based pollutants. Food production can be made far more fruitful and less wasteful of land and water, more respectful of peasants and indigenous people and less polluting. Food wastage can be cut significantly, with both social and ecological benefits.

Perhaps the greatest challenge lies in the sphere of human values. The main obstacles to achieving sustainability and human inclusion are inequality, unfairness, corruption and human trafficking. Our economies, our democracies, our societies and our cultures pay a high price for the growing gap between the rich and the poor within and between nations. And perhaps the most deleterious aspect of the widening income and wealth gap in so many countries is that it is deepening inequality of opportunity. Most importantly, inequality, global injustice, and corruption are undermining our ethical values, personal dignity and human rights. We need, above all, to change our convictions and attitudes, and combat the globalization of indifference with its culture of waste and idolatry of money. We should insist upon the preferential option for the poor; strengthen the family and community; and honor and protect Creation as humanity's imperative responsibility to future generations. We have the innovative and technological capability to be good stewards of Creation. Humanity needs urgently to redirect our relationship with nature by adopting the Sustainable Development Goals so as to promote a sustainable pattern of economic development and social inclusion. A human ecology that is healthy in terms of ethical virtues contributes to the achievement of sustainable nature and a balanced environment. Today we need a relationship of mutual benefit: true values should permeate the economy and respect for Creation should promote human dignity and wellbeing.

These are matters on which all religions and individuals of goodwill can agree. These are matters that today's young people around the world will embrace, as a way to shape a better world. Our message is one of urgent warning, for the dangers of the Anthropocene are real and the injustice of globalization of indifference is serious. Yet our message is also one of hope and joy. A healthier, safer, more just, more prosperous, and sustainable world is within reach. The believers among us ask the Lord to give us all our daily bread, which is food for the body and the spirit.

Workshop Summary

In May 2014 the Pontifical Academy of Sciences and the Pontifical Academy of Social Sciences held, at the Casina Pio IV, a Joint Workshop devoted to sustainable development. In the four days of the workshop, thirty-eight talks were presented by members of the two Academies and by invited experts, and half of the available time was spent on discussions. This report is on the main topics dealt with, on the identified roles of past, present and future development, and on proposed measures to be taken in order to ensure the long-term sustainability of forthcoming development in the context of the ongoing cultural evolution of mankind.

The Roots and History of Mankind

Referring to another workshop held in May 2013 at the Casina Pio IV on “[Via Humanitatis](#)”, the participants were reminded that the species *Homo* has its roots about 7 million years ago. We can date the start of mankind’s cultural evolution with the start of agriculture, i.e. the domestication of some plants and of some animals. This contributed about 10,000 years ago to ensuring the nutrition of humans. At this early time, members of the species *Homo Sapiens*, driven by their intellectual capacity and curiosity, might have reflected on the possible roots of themselves and of their environment. The chapter of Genesis is a remarkable testimony to the world view of several thousand years ago, containing the results of early scientific observations complemented with religious beliefs. In the past centuries, scientific investigation has become considerably more powerful. But it is only in the last about 200 years that scientific knowledge has become enriched to a degree to allow mankind to develop applications of this knowledge to facilitate its life in its encountered environment. Today, we realise that some of these biomedical and technological applications can also have specific risks. This aspect has to be considered to ensure the sustainability of future development.

Based on available astrophysical knowledge, we can assume that the cosmic evolution of our solar system together with planet Earth will persist for a few thousand million years. We can also assume that biological evolution can continue on our planet for a very long time. The sustainability of cultural developments should take this aspect into account. However, in view of the difficulties in predicting future natural developments, it is proposed that our reflections should be made with a time horizon of 10 million years, or more feasibly of 10,000 years, and not only for a few human generations.

The Science-Based Impact on the Health and Facilities of Human Beings

Statistical data reveal a remarkable increase in the past decades of human life expectancy for people living in developed countries. This is largely due to applications of available biomedical knowledge for better healthcare, including the provision of appropriate nutrition. So far these benefits have not fully reached a majority of people living in developing countries. We are aware

that this still ongoing improvement of life conditions contributes to the considerable increase in the human population on our planet.

An increasing number of technological applications of scientific knowledge also contribute to facilitating our daily lives. Historical examples are: the introduction of steam power, railroads, telegraphy, electrification, automotive transport, aviation, industrial chemistry, computing and now the digital revolution, biotechnologies, nanotechnologies and robotics. Those advances have reshaped the world economy into one that is increasingly urban and globally connected. However, just as humanity confronted “Revolutionary Change” (*Rerum Novarum*) in the Age of Industrialization one hundred and fifty years ago, today we have become a geological and geobiological force and this compels us to redefine the current age as the Age of the Anthropocene.

The Potential Risks of Human Innovations in the Anthropocene

Besides their envisaged benefits for humans and in some cases for the environment, science-based innovations may sometimes also have specific risks. It is in principle possible to predict some such risks by a good technology assessment before the introduction of the innovations. On the other hand, indicators for unexpected risks show up, often some time after the introduction of an innovation. The sustainability workshop paid particular attention to indicators of a climate shift due to a number of introduced technological applications, such as the use of coal and fossil oil as sources of energy. Obvious indicators in this case are a statistical increase in the average global temperature; glacier retreat both in high mountain areas and in polar regions, including the melting of sea ice and causing a sea level rise with increased flooding risks in coastal zones; and finally the melting of permafrost which in some cases is accompanied by the liberation of the greenhouse gas methane. Other observable effects are health-threatening air pollution in densely populated areas, as well as ocean acidification. On the other hand, increased concentrations of life-supporting components with nitrogen and phosphorus, in rivers, lakes and oceans due to the intensive use of fertilisers in agriculture, contribute to changes in life diversity in the related aqueous habitats. It is to be expected that these kinds of undesirable effects will continue to strengthen without measures being taken to prevent them.

Workshop participants also discussed both positive and negative impacts of people living in megacities, including in their slum areas providing shelter to socially excluded people.

Measures Proposed to Prevent and Mitigate Negative Impacts on the Sustainability of Cultural Development

First of all, the workshop participants favour active contributions to ameliorate the living conditions of poor populations, particularly in developing areas of our planet. This should be accompanied by measures anchored both in the natural sciences and in the social sciences. As an example,

unhealthy daily nutrition only providing calories can be improved by a richer and more diverse daily diet including the regular provision of essential micronutrients. Genetically modified Golden Rice containing a precursor of vitamin A is an excellent example of the feasibility of this proposal and its beneficial effects.[1]

Secondly, a number of measures can contribute to mitigating the role of a continued anthropogenic climate change. A good example is a possible shift to alternate sources of energy, such as solar energy and wind energy. Additional technologies are within possible reach.

Thirdly, agricultural practices should be reconsidered, including those introduced by the green revolution, in order to minimise undesirable environmental impacts in the longer term. For example, nature uses biological means to fix nitrogen. This can render plant growth much less dependent on fertilizers, although with some negative effects on the yield per unit of land surface.

Fourthly, the already mentioned process of science-based technology assessment should in principle be applied before any wide application of novel technological inventions. Similarly, political measures related to environmental aspects should also become submitted to science-based policy assessment before the introduction of the proposed measure.

Fifthly, partnerships between scientists, enterprises and political leaders, rather than single individuals or enterprises, should be involved in the introduction of novel innovations.

Sixthly, special efforts should be made to rapidly integrate available scientific knowledge on the laws of nature relating to life functions, including life evolution, into everybody's knowledge. This may require specifically devised educational programmes.

Finally, the workshop participants considered negative impacts on sustainable life conditions by the increasing density of the human population. Appropriate goals should be set to reach quickly a more stable equilibrium that can persist without a negative impact on the highly appreciated biodiversity and diversity of habitats on our planet Earth, which has a constant size and a very long life expectancy.

These defined measures can beneficially contribute to the long-term sustainability of the future evolution of life and of environmental habitats offered by Mother Nature to all living organisms.

[1] cf. *Transgenic Plants for Food Security in the Context of Development*, Proceedings of a Study Week of the Pontifical Academy of Sciences, Ingo Potrykus and Klaus Ammann (eds.), New Biotechnology, Vol. 27, Issue 5, November 2010, Elsevier, Scripta Varia 113, ISSN 1871-6784.

