



Communiqué
Meeting of the G7 Ministers of Science
Berlin, 8–9 October 2015

Ministers' summary

Main action points

- We plan to comprehensively and continuously map and coordinate publicly funded research on poverty-related infectious diseases and neglected tropical diseases, the future of the seas and oceans, clean energy, and research infrastructures in our countries and share the results of the research with relevant stakeholders.
- On the basis of a joint analysis, we intend to continue to work to identify the priority research areas for each stage in the life cycles of plastics, identifying options to combat the entry of plastic waste into the seas and oceans. As an essential component to the G7 Action Plan to Combat Marine Litter, we are committed to a concerted and interdisciplinary research, education and literacy programme.
- Building on today's announcements on the topics of poverty-related infectious diseases and neglected tropical diseases, the future of the seas and oceans, and clean energy, we plan to use and strengthen existing coordination mechanisms and action programmes and encourage further research activities.
- We intend to raise the efforts, cooperation, and transparency of our energy research in order to accelerate the urgently required technological progress towards clean energy. In doing so, we intend to take into account questions of civil society involvement and social acceptance.

- For a sustainable implementation of today's announcements, we are planning to hold regular meetings of the G7 Science Ministers at the discretion of the G7 Presidency, at which progress on these topics will be reviewed.
- We intend to strengthen the implementation of, and ensure we make progress on, today's decisions. We encourage that the previous, present, and incoming leadership of the G7 Science Ministers meet regularly at senior officials' level to promote this process.

Introduction

We, the Science Ministers and their representatives from Canada, France, Germany, Italy, Japan, the United Kingdom, the United States, and the Commissioner for Research, Science and Innovation of the European Union, guided by the motto of Germany's G7 Presidency – "Think ahead. Act together" – have resolved at the G7 Meeting of the Science Ministers in Berlin on 8–9 October 2015 to take action to further develop a global knowledge society.

We recognise that science plays a pivotal role in providing solutions to global challenges as well as enabling innovation and securing the prosperity of our countries. We emphasise that science can provide solutions to many of the complex issues highlighted by the G7 leaders at Elmau – from health to climate change, from energy to the environment.

Our main objective from today's meeting is to focus on science in the areas of health and environment and contribute to solutions to the global challenges that are present in these fields. We recognise and acknowledge the importance of our science academies and research organisations, as well as the private sector, in supporting this process at the national and international levels.

We share the intention to engage in closer cooperation on the following four topics:

1. Neglected tropical diseases (NTDs) in the wider context of poverty-related infectious diseases (PRDs)

During the G7 Summit in Germany this year, the G7 Leaders declared to step up efforts to improve the health of all people, in particular by including the fight against NTDs in the wider context of healthcare system strengthening.

Considering

- the devastating aftermath of the recent Ebola outbreak,
- the continuous high burden of malaria, tuberculosis and HIV/AIDS as well as other infectious diseases like diarrheal and pulmonary infections in poorer countries,
- frequent co-morbidities among these diseases,
- and many common issues in regard to public health and implementation,

And encouraged by the recent award of the Nobel Prize to William Campbell and Satoshi Omura for their work fighting elephantiasis and river blindness and to Tu Youyou, for tackling malaria using traditional herbal medicine,

We decided to consider a range of PRDs, ensuring focus on NTDs, diseases of epidemic potential, and high burden diseases such as malaria, tuberculosis and HIV.

We intend to coordinate with G7 Health Ministers and other stakeholders to address the full spectrum of challenges, including R&D, prevention, the distribution of drugs and early diagnostics for PRDs and NTDs, and other pressing health concerns such as diseases with emerging resistance (such as malaria and tuberculosis) and Ebola.

I. Fighting Neglected Tropical Diseases (NTDs)

As is the case for PRDs, the majority of NTDs are still insufficiently treated and controlled in wide areas of the world. Some interventions against NTDs are

highly cost-effective; however, for some NTDs the number of effective drugs is limited and threatened by resistance. In addition, some mainstream treatments for NTDs can have severe side effects.

We, the G7 Science Ministers, plan to support this endeavour by initiating dedicated research and development (R&D) and related activities, guided by the recommendations of the G7 Academies of Science of April 2015 and in consultation with the developing countries concerned.

As a first step, we continue to support existing work and enhance the mapping and coordination of publicly funded R&D activities and programme support on NTDs in the G7 and beyond. In doing so, we intend to rely on existing data repositories, such as the G-finder report and the World RePORT illustrative mapping development database. Mapping data is expected to be shared with relevant stakeholders. We intend to work closely together and support the WHO Global Observatory for Health R&D, WHO PC-NTD Databank and the Coalition on Operations Research for NTDs (COR-NTD) and other relevant initiatives, for example the Special Programme for Research and Training in Tropical Diseases (TDR).

II. Maximizing research impact by better coordination of on-going and planned research on PRDs

We are committed to better coordinating our national R&D activities on PRDs and NTDs by building on existing mechanisms (e.g. the WHO Global Observatory for Health R&D, the European and Developing Countries Clinical Trials Partnership (EDCTP) and the European Joint Programming Initiative on Antimicrobial Resistance). The coordination of R&D activities in G7 countries and beyond will help to ensure that activities will be focused on areas of most urgent need and will help to advance progress toward the WHO 2020 NTD goals. Coordination will also help to increase efficiency and ensure critical mass. In addition to better coordination of our activities, we aim to develop

joint R&D activities and action programmes. We plan to hold a workshop in 2016 aimed at promoting better coordination of research investments.

Open data and transparency is also essential to maximizing research impact. This includes open and enhanced access to research findings through openly accessible publications. This issue is particularly critical during public health emergencies, in which there is a need for open access to both epidemiological and clinical trial data, as early as possible in the crisis.

III. Continued financial support for relevant R&D and operational research on PRDs and NTDs

Taking into account the priority given by the G7 on further strengthening health systems in developing countries and continuing efforts to provide community based health services, we intend to increase relevant R&D efforts aiming at developing drugs, vaccines, and diagnostics for both NTDs and PRDs according to the national research agendas of the G7 countries and the needs of the developing countries. Particularly we intend to focus on R&D efforts aimed at accelerating progress toward reaching the WHO NTD 2020 Goals. We acknowledge that product development partnerships (PDPs) and other innovative instruments are particularly required to bring new interventions for control and therapies to affected communities and patients rapidly. In addition to our national efforts and based on better coordination, we aim to develop a pilot joint research activity – also capitalising on existing initiatives like EDCTP – for R&D projects that build research capacities in high PRD and NTD burden countries.

We intend to further these efforts in the future. Progress and sustainability with regard to the outlined activities should be reported at future meetings of the G7 Science Ministers at the discretion of the G7 host country.

2. Future of the Seas and Oceans – Joint research for the preservation and sustainable use of the marine environment

The seas and oceans are vital to the well-being and economies of all countries. A healthy marine environment fuels our economies, feeds our citizens, employs our workers, provides places for recreation and tourism, and stimulates knowledge through research, education, and discovery. Because the world's seas and oceans are interconnected, local and global stressors, including pollution, poor resource management, and climate change, are causing detrimental changes to the marine environment and to the productivity and resilience of coastal and marine resources that need to be addressed as a global community. Developing countries are likely to be those most strongly affected.

The global population is expected to grow to 9 billion by 2050 with a significant proportion living in low-lying coastal cities. This population growth is driving increasing demand for food, energy, and resources. While the ocean is a vast resource, human activities threaten the ocean's productive capacity needed to sustain human livelihoods and wellbeing.

To address environmental concerns, such as plastic waste in the seas and oceans, ocean acidification and the loss of marine biodiversity, as well as negative impacts of deep sea mining, it is essential to understand the ocean as a whole through international scientific cooperation. Particularly important will be increased efforts to forecast, manage, and improve the changing marine environment and its influence on marine ecosystems.

The G7 Leaders recognised marine litter, especially plastic waste, as a global challenge to marine, coastal, and deep sea ecosystems, potentially affecting human health and ecosystem services.

They also recognised the growing interest in deep sea mining beyond the limits of national jurisdiction, and the opportunities it presents and the work of

the International Seabed Authority (ISA) on a code for sustainable deep sea mining.

I. Research on marine litter

Marine litter – trash and other solid material that enters the ocean – along with associated contaminants, threatens marine life and habitats and presents health and safety concerns for humans. In particular, plastic is versatile, lightweight, flexible, moisture-resistant, durable, strong, and relatively inexpensive – all qualities that have made it an indispensable product, but that also allows it to persist in the environment.

We, the G7 Ministers of Science, are pleased that the G7 countries decided to collaborate more effectively in the fight against marine litter and endorsed the G7 Action Plan to Combat Marine Litter. The Action Plan also includes the support and stimulation of further research initiatives to analyse marine litter and the development of new counteractive measures that might add value to existing work being taken forward, for example, at the national and regional level. Recognising the on-going process of the G7 Leaders on this topic, we are committed to coordinating with them on the implementation of the action plan and related efforts.

a) Strengthening research efforts to better understand the extent and impacts of plastic waste in the seas and oceans

We, the G7 Ministers of Science, acknowledge the activities of other international and intergovernmental organisations such as the European Joint Programming Initiative "Healthy and Productive Seas and Oceans (JPI OCEANS)", the successful work under the Galway Statement initiative and the UN–Environment Assembly Study (UNEA), in their search for sources, pathways and effects of marine litter. We intend to engage in existing initiatives to facilitate research efforts on a number of key scientific questions relevant to assessing

the extent and impact of plastic particles in the seas and oceans and coastal waters, such as those outlined in the annex.

b) Encouraging a joint analysis identifying the priority research areas that can provide options to reduce the intrusion of plastics in the seas and oceans

We recognise the potential for an interdisciplinary analysis to describe important research topics concerning the essential pathways and life cycles of plastics and to present options for the reduced entry of plastic waste into the seas and oceans as well as to examine the cost and effectiveness of best available technologies and environmental practices against marine litter (e.g., via changes in consumer behaviour, more effective retention of plastics through better waste management, and the development of innovative recycling technologies).

We acknowledge the potential for collaborative studies designed to develop information about culturally relevant behavioural change, socio-economic impacts of potential policy responses, and successful educational programs (including on a regional basis), in order to formulate effective prevention and response strategies.

c) Encouraging the development of a concerted interdisciplinary research, education, and literacy programme

We acknowledge the importance of a common interdisciplinary research cooperation to support measures to combat marine litter and plastic waste in the seas and oceans. We intend to contribute to a concerted and interdisciplinary research, education, and literacy programme as an essential component of the G7 Action Plan to Combat Marine Litter. We also recognise that international research cooperation could lead to a better understanding of the impact of litter on marine ecosystems and to the development of possible sustainable and cost-effective retrieval technologies for plastic waste from the

world's oceans, coastal, and inland waters. We intend to raise awareness among citizens through public relation and educational work (literacy).

II. Research on environmental impacts of deep sea mining

Deep sea mining may one day be economically viable and contribute to the world's ongoing resource needs. But not enough is known about deep sea ecosystems and these unique habitats to be certain of the impacts that mining activities will have.

It is important to assess the nature and scale of the potential impacts from deep sea mining, and how they will affect ecosystems and the environment. In this respect, greater knowledge is needed concerning the diversity, resilience, species ranges, and life cycles of deep sea fauna, as well as ecosystem functioning.

In taking note of the growing interest in deep sea mining beyond the limits of national jurisdiction, the G7 Leaders identified as a priority enhancing the effective protection of the marine environment from harmful effects that may arise from deep sea mining, including both taking a precautionary approach in deep sea mining activities and conducting environmental impact assessments and scientific research.

We, the G7 Ministers of Science, acknowledge that some countries have carried out such research cooperatively under other auspices, for example through the European Joint Programming Initiative on "Productive and Healthy Seas and Oceans (JPI Oceans)." We encourage G7 countries that have a desire to carry out research to assess the nature and scale of the potential impacts of mining and how they would affect deep sea ecosystems, consistent with their other national priorities for oceans research.

We also acknowledge that there are broader areas of research on marine ecosystems that are of general interest to all G7 countries. Such research can

help enhance the effective protection of the marine environment from the harmful effects of human activities. We, the G7 partners, intend to strengthen our international cooperation in marine ecological research more broadly.

III. Further cooperation of international science for the Future of the Seas and Oceans

In addition to the two challenges mentioned above, on marine litter and the environmental impacts of deep sea mining, we, the G7 Ministers of Science, also recognise that all of the changes in the oceans, such as ocean acidification, warming and de-oxygenation, the loss of marine biodiversity, and degradation of marine ecosystems, have profound impacts on human wellbeing and human societies in many regions of the earth.

We, the G7 Science Ministers, agree that a step change in approach is required if we are to address the challenges our seas and oceans face. We, therefore, commit to continuing discussions and developing a proposal for how we can most effectively enhance international cooperation amongst the G7 and other interested countries ahead of the next Science Ministers meeting in Japan. This will enable us to better predict, manage and mitigate future changes in the seas and oceans and their impacts on the environment and on human societies.

3. Global Research Infrastructures (GRIs)

In 2008, we decided to establish the “Group of Senior Officials on Global Research Infrastructures (GSO on GRIs)” in order to promote information sharing and facilitate international cooperation on the planning and development of global research infrastructures. In 2013, we agreed on the basic principles for international cooperation on GRIs through adoption of a Framework for GRIs. We mandated the GSO to promote the Framework, continue to share information on prospective GRIs, and to draft a

representative list of those research infrastructures open to global cooperation of interest to new partners. We invited the GSO to report on progress in 2015.

We welcome the GSO's report and the accompanying list of those research infrastructures for which the GSO partner countries are interested in greater international cooperation in the future or in extending existing scientific collaboration.

We welcome the progress of the GSO and in particular support the following:

- The GSO will conduct representative case studies to test its Framework for GRIs and identify good practices for the establishment and development of future GRIs.
- The GSO should continue exploring the potential for existing research infrastructures to be opened up to international partners on the basis of existing legal structures.
- Access to GRIs should be established on the basis of a peer review process with a focus on scientific excellence.
- The GSO should continue to develop and promote the concept of global excellence-driven access for future GRIs, developing the specific details of the concept in a qualitative manner for further implementation.
- Further progress on sharing and managing scientific data and information should be achieved, especially by continuing engagement with community based activities such as the Research Data Alliance RDA.
- We encourage the GSO to continue their work on convergence and alignment of inter-operable data management that could accomplish an effective open-data science environment at the G7 level and beyond.

We affirm the mandate of the GSO and ask the GSO to present another report to the G7 Science Ministers on the progress made with improved international coordination and with the evaluation of good practice examples in spring 2017. The aim of this report will be to show what conditions are most suitable for improved coordination among international partners, to the benefit of

international users and for effective policy and management related to open data in science.

In addition, noting that development of research infrastructure takes time, we ask that the GSO consider the future and that members increase efforts to share plans and domestic prioritisation exercises, in order to help identify potential opportunities, risks, gaps, or overlaps in capability that may need to be addressed as science and technology continue to develop over the next 20 years.

4. Clean Energy –Towards clean energy with joint research and development

In their G7 Summit Leaders' Declaration, the Heads of State and Government have committed to doing their part to achieve a low-carbon global economy in the long-term, including developing and deploying innovative technologies and striving for a transformation of the energy sector by 2050. They have confirmed their will to raise the overall coordination and transparency of clean energy research, development, and demonstration.

We, the G7 Science Ministers, acknowledge the need and importance of clean energy research. Within the scope of our competencies and powers, we, working with other interested countries, aim to advance economically advantageous and socially accepted clean energy technologies.

We welcome the Hamburg Initiative for Sustainable Energy Security of the G7 Energy Ministers, whose Communiqué lists secure energy systems (this year including in particular electricity security and cyber security), support of most vulnerable countries, energy efficiency, and innovative energy technologies as areas for close cooperation with their partners.

Complementary to the G7 Energy Ministers' Initiative, we confirm our intention to contribute our share in the field of clean energy research and help ensure the successful transformation of the energy system by 2050.

Transformation towards clean energy, by accelerating widespread clean energy innovation, is an indispensable part of an effective, long-term global response to our shared climate challenge; necessary to provide affordable and reliable energy for everyone; and critical for energy security. While significant progress has been made in cost reduction and deployment of clean energy technologies, the pace of innovation and the scale of transformation remain short of that needed for a clean energy revolution that meets our economic, environmental, and security goals in a timely way. Accelerating the pace of innovation will lead to improvement in the quality of life worldwide and allow increasingly ambitious national clean energy goals over time. Working with other interested countries, we intend to increase our efforts, cooperation, and transparency for clean energy research in order to accelerate the urgently required technological progress towards clean energy, thus making technological solutions available to society as early as possible.

This technological progress cannot be accomplished without involving civil society. We recognize that the transformation of our energy system can only be achieved if related technological advances are backed by our citizens. We therefore want to include questions of implementation and social acceptance in setting priorities for our research.

Recognising that a step-change, global effort is required to accelerate the pace of technology advance and cost reduction, we call on all interested countries to join with G7 countries in order to promote clean energy research and the transformation of our energy systems.

The initiative should be further developed by a suitable working group, which will align with the G7 Energy Ministers' initiative and may expand to involve other interested countries and organisations (for example the IEA), and we intend to establish its details through intensive discussions at the working level over the next few months. This process should conclude with a joint

statement on further action thereby taking into account the results of the G7 Energy Minister initiative.

Further implementation

We are committed to making progress on the decisions taken at today's G7 Science Ministers Meeting and have therefore reached consensus on the following:

- We acknowledge the value of the Science Ministers' Meetings and plan to hold regular meetings in the future, at the discretion of the G7 host country.
- We share the intention to seek an open dialogue with other countries, by addressing the topics discussed in the G7 context at our regularly scheduled bilateral or multilateral discussions on science and technology with those countries.
- We intend to promote research and capacity building in partnership with less advanced countries so that global challenges, such as the preservation of marine environment, can be addressed by all for a shared benefit.
- We intend to share information on and improve coordination of our national work programmes in science and research in the areas of poverty-related infectious diseases and the future of the seas and oceans. Furthermore, we intend to explore possibilities of greater cooperation among our national programmes.
- Within the G7 Presidencies, we intend to work on and share regular progress reports in terms of our decisions and publish them.
- We recognise that the sharing of Earth observation data and information will strengthen science, knowledge, and decision-making in the areas discussed today and in others. We intend to continue to work together through the intergovernmental Group on Earth Observations (GEO) to enable policy makers to better address these environmental, health, and socio-economic challenges.

- We intend to exploit synergies with operating international fora that already involve some G7 countries, such as between GSF–OECD and GSO, with the ultimate aim of effectively gathering high quality data and analysis to support the decision–making processes of the G7 countries. Along this line, we are committed to continuing progress on the decisions taken at today's meeting, for example at the Ministerial Meeting of the OECD Committee for Scientific and Technological Policy in Korea in October, the Carnegie Group meeting in India in November, and the G20 Ministers' Conferences.
- Ahead of COP 21, we urge a long–term strategic approach to research in the oceans, looking holistically at the challenges, including the way we can protect the oceans from the effects of climate change.
- We would welcome the opening up to G7 countries of existing research initiatives such as the JPI OCEANS Pilot actions.
- We intend to strengthen the implementation of, and ensure we make progress on, today's decisions. We encourage that the previous, present, and incoming leadership of the G7 Science Ministers meet regularly on senior officials' level to promote this process.

We look forward to meeting at the next Science Ministers' Meeting which will be held in Japan in the city of Tsukuba in Ibaraki Prefecture on 15–17 May 2016.

Annex: Research on marine litter

The global production of plastics was about 250 million tons in 2013. The increasing entry of waste, mainly plastic products, into our seas and coastal waters increasingly impact those bodies of water. The majority of the initially floating plastic waste (about 70%) sinks – due to biofouling – to the seafloor. The remainder accumulates in roughly equal proportions in the large oceanic eddies (e.g., the Pacific Garbage Patch) or is washed up on coastlines and beaches. Larger plastic particles in the ocean or on beaches disintegrate through UV radiation and wave action into smaller fragments. When these particles are smaller than 5 mm, they are called “secondary microplastics.” Primary microplastic particles, e.g. in personal care products, are washed “down the drain” in our wastewater and thus also end up in the sea. Regardless of their size or type, it takes centuries for these particles to completely disintegrate.

In Europe, the “Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI Oceans)” is currently coordinating European intergovernmental R&D activities on the seas and oceans. One of JPI Oceans’ first pilot actions has been to initiate a joint funding announcement among 10 European states to develop a uniform analytical methodology on micro-plastics, in order to make scientific studies comparable and to identify toxicological effects on marine organisms and therefore to humans at the end of the food chain.

Because of the global importance of this issue – in addition to the urgent need for prevention measures – there is an urgent need for closer international cooperation on the analysis of the problem and the search for solutions. The G7 is one of the relevant forums to provide the necessary global cooperation and to take action in this area.

Building upon the European *JPI Ocean* pilot action we, the G7 partners, are reinforcing our international research cooperation and affirm that increased efforts are needed on analytical method harmonisation and eco-toxicological

assessment of the effects of plastic waste in the sea, as well as potentially to our food.

Building on on-going initiatives and studies, scientific research needs to be intensified in joint programmes to foster international cooperation to address the following questions and aspects:

- What is the scale of the quantity of plastic entering and accumulating in the oceans?
- What are the forms in which plastic and its breakdown products are found?
- What are the lifetimes and fate of plastics and their breakdown products and how are they transformed in the marine environment?
- How might analytical, monitoring, and assessment methods be advanced and litter (including micro-plastic) measurements be standardized to better understand the above questions?
- What is the impact of plastics and their breakdown products on marine species, including commercially fished and farmed species?
- What are possible threats to seafood safety and human health?
- What are the impacts on marine life and ecosystem and global ocean health, including eco-toxicological effects?
- What needs to be known about culturally relevant behavioural change, socio-economic impacts of potential policy responses, and successful educational programs (including on a regional basis), in order to formulate effective prevention and response strategies?
- Identify accumulation areas of marine litter and establish an exchange platform on experiences in marine litter removal on the sea surface, beaches, seafloor, the water column and ports.
- Support the removal of litter where it poses a threat to sensitive marine ecosystems, in an environmentally sound way, taking into account the socioeconomic aspects, and assess the economic cost and environmental impact of retrieval technologies.