



Chapter 4.

Programme Governance, Operational Mechanism and Management

A justified scientific mission does not guarantee success in implementation. For an international scientific programme like IRDR to be successful, apart from its well-crafted scientific plan, it depends also on how the programme is governed, operated, and managed. Over last ten years, IRDR's governance, operations and management have evolved along with the implementation of

its work. From the operational aspect, IRDR's strengths are its Scientific Committee (SC), Working Groups (WGs), National Committees (NCs), International Centres of Excellence (ICoEs), YSP, and broad partnership with others working in the field of DRR. However, gaps and shortcomings are also well documented.

4.1

Structure of the IRDR Community⁵⁵

IRDR is co-sponsored by the International Science Council (ISC, which was created in 2018 as the result of a merger between the ICSU and the ISSC) and the United Nations Office for Disaster Risk Reduction (UNDRR, former acronym UNISDR). The execution of IRDR programme, including promotion, coordination and related functions is undertaken by the IRDR IPO. The IPO is located in Beijing, China and is hosted by the Aerospace Information Research Institute (AIR) of the CAS. Funding is provided by the CAST.

IRDR SC

IRDR is governed by a SC set up by and on behalf of the Co-Sponsors. In the past ten years, IRDR SC has included in total 41 outstanding experts from a diverse range of disciplines, taking into account regional and gender balance. The responsibilities IRDR SC are to define, develop and prioritise actions for the IRDR, guide its programming, budgeting and implementation, establish a mechanism for the oversight of programme activities, and disseminate and publicize its results on behalf of the co-sponsors⁵⁶.

⁵⁵ The IRDR current organigram was built in 2018, as part of the response of the 2016 Mid-term Review to improve the management and governance.

⁵⁶ IRDR SC is the 'central brain' of IRDR programme. The original scope of its responsibilities proved to be over balance between programme management and scientific direction. This issue was addressed by the 2016 mid-term review, resulting in the current amended list of responsibilities.

The specific tasks of the IRDR-SC

- (a) To further define the inter-disciplinary scientific strategy and determine its specific objectives and priorities; this will involve, through an extensive consultation process, the continued identification and exploration of the major programmes and projects that exist in the field of natural and human-induced hazards and disasters and, where appropriate, the conclusion of agreements as to how they might become components of IRDR.
- (b) To develop, and keep under continuous review, an implementation plan for the Programme in close consultation with potential research partners, and to ensure that the plan develops in such a way as to make optimal use of available resources;
- (c) To establish and implement a mechanism for the design, guidance, development and oversight of the Programme;
- (d) To facilitate the exchange of information among the scientists participating in the Programme and the natural and human-induced hazards and disaster community in general, as well as relevant scientific institutions and agencies at the national and international levels;
- (e) To promote the goal and objectives of the Programme, its deliberations and achievements through development of capacity building and outreach programmes in order to attract and form a new generation of individuals at all levels that can address natural and human-induced hazard and disaster issues, and to capture the interest of the general public and decision-makers in the importance of risk reduction for human well-being and sustainable development;
- (f) To work with appropriate organizations, including the Global Terrestrial and Ocean Observing Systems (GTOS and GOOS) and the Group on Earth Observations (GEO) of the Global Earth Observation System of Systems (GEOSS) to ensure the development of sustained monitoring and enable continuous observations relating to natural and human-induced hazards;
- (g) To convene sessions of an Open Consultative Forum to which all stakeholders will be invited. The Forum will serve as a consultative process for expressions of views on the Programme development, as a platform for dialogue among the various stakeholders and as a venue for exchange of information on Programme implementation. The Forum shall be convened at least once per year, preferably in conjunction with a major international disaster and risk event;
- (h) To raise additional funds for the planning and coordination activities, including activities of any working groups that the SC-IRDR may wish to set up, and to assist in convincing national and international funding bodies to fully support the research activities of the Programme; and,
- (i) To provide oversight and guidance to the activities of the IPO of IRDR.

◆ Outcomes of SC meetings⁵⁷

The Scientific Committee meeting convenes twice a year. The overall objectives of the SC meeting are to make decisions on actions and plans and to review the progress of implementation of such.

[SC1] 12-13 May 2009 (Bergen, Norway)

The 1st IRDR Scientific Committee meeting mainly examined the Term of References for IRDR SC, discussed the establishment of IRDR IPO and the funding mechanism; recognized the co-sponsorship by ICSU, ISSC and UNISDR; acknowledged the role of ISDR Scientific and Technical Committee in providing “strategic guidance on research needs” for disaster risk reduction and oversight of progress”; and agreed that a mechanism was needed to be put in place to ensure strong collaboration and exchange. The meeting set forth five actions for Working Groups and Task Teams, four actions for Partner and joint activities, and two actions for the whole IRDR community.

[SC2] 21-23 October 2009 (Paris, France)

The 2nd IRDR SC meeting provided updates on the case studies and demonstration projects; explored cooperation with UNISDR systems and articulation with ICSU regional programmes on hazards and disasters; proposed the concept of International Centres and National Committees for IRDR; prepared Memoranda of Understanding with identified partners; published the announcement for the recruiting of IRDR IPO staff especially the Executive Director; and discussed the promotion of IRDR and its objectives.

[SC3] 14-16 April 2010 (Paris, France)

The 3rd IRDR SC meeting announced the

appointment of the first Executive Director and the establishment of the IPO at the Center for Earth Observation and Digital Earth (CEODE) of CAS in Beijing; nominated three Vice Chairs of SC and created the Executive Committee; provided updates on the collaborations with partners; advanced the establishment of IRDR Working Groups, National Committees and International Centres of Excellence; and discussed the preparation of the IRDR Conference.

[SC4] 15-17 November 2010 (Beijing, China)

The 4th IRDR SC meeting was the first meeting hosted by the IPO. In this meeting, the IRDR Constitution was signed by the Sponsors, namely ICSU, ISSC and UNISDR. UNISDR agreed that IRDR would be the body helping it convene and coordinate the Science Forum at the 4th session of the 2013 Global Platform for Disaster Risk Reduction. IPO provided an outline of the IRDR Work Plan. Four NCs were launched (China, Japan, France, Canada). The application of ICoE-Taipai was approved. The Terms of Reference of NC and ICoE were fixed and approved. The meeting further provided updates on the activities and research plans of Working Groups (RIA, Disaster Loss Data, FORIN, Disaster Assessment). Finally, preparation work for the IRDR Conference was initiated.

[SC5] 27-29 April 2011 (Paris, France)

The fifth IRDR SC meeting welcomed three new SC members; appointed the new Chair; launched the Annual Report and the official website; and provided updates on the activities of the IPO, WGs, NCs and ICoEs.

[SC6] 28-29 Oct. & 3 Nov. 2011 (Beijing, China)

The 6th IRDR SC meeting provided updates on

57 The documents of all SC meetings are available at IRDR website.

the activities of the IPO, WGs, NCs and ICoEs; announced confirmed partnerships with WCRP, START, EC/JRC, and WWRP; developed the selection process and criteria for NCs and ICoEs; and reported the wrap-up and after action of IRDR Conference 2011.

[SC7] 09-12 May 2012 (Ravello, Italy)

The 7th IRDR SC meeting submitted the Annual Report 2011; discussed the IRDR Strategic Plan; provided updates on the activities of the IPO, WGs, NCs and ICoEs; and proposed new initiatives. It was further suggested that NC Colombia could be developed into an IRDR Regional Committee for Latin America; and determined that the ICSU Regional Office for Asia and the Pacific (ROAP) would be a regional network link to IRDR.

[SC8] 04-07 November 2012 (Chengdu, China)

The 8th IRDR SC meeting reported on the activities of the IPO and WGs aligned with the goals of IRDR Strategic Plan; embraced the new SC member and new Chair; provided updates on the activities of NCs and ICoEs; and planned the IRDR Conference 2014. The ICSU presented the launch of the Future Earth programme, encouraging IRDR to communicate with the regional offices of Future Earth on DRR. ISSC suggested IRDR to submit a panel. UNISDR encouraged IRDR to conduct a session at its 2013 Global Platform (GP) GP2013 to illustrate the role of integrated sciences in policy and practice. Finally, to better reflect ongoing institutional changes, IRDR host CEODE adopted the new name of Institute of Remote Sensing and Digital Earth, CAS.

[SC9] 18-20 May 2013 (Geneva, Switzerland)

The 9th IRDR SC meeting approved the 2012 Annual Report and IRDR Strategic Plan 2013-2017. The contributions from the IRDR community to the ICSU's International Scientific Unions,

World Social Science Report 2013, Global Assessment Report (GAR) 2013, GAR 2015, GP 2013 and CAS-TWAS Centre of Excellence on Space Technology for Disaster Mitigation were reported. Updates on the activities of WGs, NCs, ICoEs were provided. More funding opportunities and partnerships were explored.

[SC10] 12-14 November 2013 (Sanya, China)

The 10th IRDR SC meeting provided updates on the activities of the Co-sponsors, Host, IPO, WGs, NCs and ICoEs; reviewed applications from new NCs and ICoEs; discussed the appointment of a new Executive Director to the IPO; examined IRDR's participation in the ICSU ROA and ROLAC workshops; and noted IRDR's contributions to the UNISDR STAG Report, the UNISDR Terminology on DRR and the UNISDR AMCDRR. Finally, in collaboration with ICSU, IRDR submitted a briefing document to the SDGs process.

[SC11] 10-11 June 2014 (Beijing, China)

The 11th IRDR SC meeting provided updates on the activities of the Co-sponsors, Host, IPO, WGs, NCs and ICoEs. ICSU announced that there would be an evaluation of IRDR starting in mid-2015. UNISDR invited ICSU to be the Organising Partner for the science and technology (S&T) community for the process leading up to the UN WCDRR, and IRDR would play a prominent role therein. Final arrangements for IRDR Conference 2014 were made. WGs and ICoEs reported on their working plans. A number of researchers from China joined three breakout sessions for DATA, FORIN and RIA.

[SC12] 13-15 November 2014 (Paris, France)

The 12th IRDR SC meeting provided updates on the activities of the Co-sponsors, Host, IPO, WGs, NCs and ICoEs. ICSU provided an update of the scientific review of the 17 goals and 169 targets proposed by the UN Open Working Group for the SDGs on the disaster risk aspect. IRDR submitted

an independent statement to the pre-zero draft of the Post-2015 Framework for Disaster Risk Reduction. Finally, the function and possibility of a “Consultative Forum” were discussed.

[SC13] 1-3 June 2015 (Qingdao, China)

The 13th IRDR SC meeting reviewed and commented upon the Action Points; highlighted the role IRDR played at the 3rd WCDRR; and looked back at the STMG statement it gave on 17 March 2015, in particular the '4 + 2' formula agreed upon by STMG leaders for the implementation of the Sendai Framework as the key overarching commitment. In addition, the London Reflections on Phase II of IRDR was compiled into paper form as the starting point for a discussion about the next phase of the programme (reviewing achievements, obstacles and opportunities). Additional partnership possibilities in China were explored, including with the Chinese Psychological Society, Beijing Normal University/Integrated Risk Governance, UNESCO-HIST, and Centre of Excellence on Space Technology for Disaster Mitigation.

[SC14] 16-18 November 2015 (West Cape, South Africa)

The 14th IRDR SC meeting provided updates on the activities of the Co-sponsors, Host, IPO, WGs, NCs and ICoEs. The major review questions for IRDR were provided by ICSU. The stakeholders agreed to postpone IRDR Conference 2016. The position of IRDR at UNISDR S&T Conference was discussed, and it was agreed that IRDR would continue to contribute on the S&T Roadmap and S&T Partnership. Four Panels were organised to address updates from Africa on the advances in integrated research on DRR on the continent.

[SC15] 5-6 May 2016 (Paris, France)

The 15th IRDR SC meeting briefly reflected on the programme over the past 5 years and considered this transition period with support from ICSU,

ISSU and UNISDR. Issues which arose over the course of the programme thus far were examined; outcomes of the UNISDR Scientific and Technical Advisory Group (UNISDR/STAG) conference on science and technology were reported and discussed; and partnerships with SEI and Global Alliance of Disaster Research Institutes (GADRI) were explored.

[SC16]29-30 November 2016 (Sanya, China)

The 16th IRDR SC meeting welcomed the new Executive Director. In addition, the IRDR Mid-Term Review Report was presented, based on which strategic future directions were discussed, all in preparation for a new strategic plan. The meeting also established the IRDR Young Scientists Programme and approved two IRDR Flagship Projects.

[SC17]22-23 May 2017 (Cancun, Mexico)

The 17th IRDR SC meeting focused on the IPO's updated efforts to support science and technology plan at national level; the presentation and review of the IRDR Strategic Plan of Action; and a discussion of the collaboration mechanism of ICoEs. A concept note would be drafted.

[SC18]20-21 November 2017 (Tokyo, Japan)

The 18th IRDR SC meeting welcomed the new Executive Director. ICSU reported the merger between ICSU and ISSC, which was finalized at 32nd ICSU General Assembly, and made clear its expectations for a vital collaboration among IRDR, Future Earth, WCRP and Urban Health and Wellbeing. The meeting also discussed the concept of Risk Knowledge Action Network (KAN); and reviewed the IRDR Communication Strategy presented, looking at improving ICoE regular meetings and communications. A special issue as the IRDR legacy was proposed. This meeting directly piggybacked upon the Global Forum on Science and Technology for Disaster Resilience 2017.

[SC19]15-16 April 2018 (Beijing, China)

The 19th IRDR SC meeting took place prior the 2nd Asian Science and Technology Conference for Disaster Risk Reduction (ASTCDRR 2018). Before this session of IRDR SC meeting, a Coordination Meeting between IRDR Co-sponsors, the host, the Chair of IRDR SC and IRDR IPO was held in Paris as a follow-up of 2016 Mid-term Review, and in particular to examine the Action Plan 2018-2020 proposed by IPO. The SC meeting noted the expectation from the co-sponsors to IRDR to improve the coherence and mutual reinforcement between the Sendai Framework, the SDGs and the Paris Agreement. The SC meeting approved IRDR Action Plan 2018-2020, and actively participated ASTCDRR 2018, and anticipated its roles in the Asian Ministerial Conference for Disaster Risk Reduction (AMCDRR 2018) and UNESCO Youth Forum.

[SC20]15-18 October 2018 (Chengdu, China)

The 20th IRDR SC meeting looked at the progress made in the implementation of IRDR Action Plan 2018-2020. The meeting concurred with the Co-sponsors on five priority areas for actions: coherence between the Sendai Framework, SDGs and Paris Agreement at national, local and community levels, urgency in reaching the Sendai Framework deadline of 2020 on Target E, expansion of scope of risk, improvement of capacity on data disaggregation, science policy interface and youth engagement. The meeting also discussed IRDR's organization of pre-event and specific sessions at GP2019 as well as the future of IRDR more broadly. The meeting noted the official merging of the IRDR host institution with other CAS institutions and renamed as The Aerospace Information Research Institute (AIR). This meeting was in conjunction with a UNDRR meeting mainly focused on the review of the S&T Roadmap. A field trip to investigate the recovery and resilience strategies of cultural heritage sites in Chengdu area was organized.

[SC21]14 May 2019 (Geneva, Switzerland)

The 21st IRDR SC meeting took place after the Science-Policy Forum of GP2019, which IRDR organized together with ISC and UNDRR. It was a half-day meeting reviewed the effort and contributions of IRDR to GP2019, particularly to the Science-Policy Forum. The concept of the IRDR Compilation 2010-2020 was proposed by IPO and was approved. A book titled IRDR: Contributions from IRDR Young Scientists proposed by two SC members was approved. The meeting confirmed that there would be an IRDR Conference in 2020. The concept of the IRDR Compilation was proposed and approved, and the IRDR Handbook and previously mentioned special issue were updated.

[SC22]8-10 October 2019 (Xiamen, China)

The 22nd IRDR SC meeting's overall objective was to put together ideas from the IRDR community for a DRR integrated research agenda towards 2030, as it looks to the future of IRDR. To this end, the ISC's new Action Plan 'Science as a global public good' and GAR2019 were presented; the IRDR contribution to GP2019, especially the contribution to S&T Roadmap was introduced; an update on the development of Risk KAN was provided; and a seminar to review the draft Hazard Terminology and Classification was organised. A new science plan on risk science and to guide IRDR 2.0 was expected to be prepared in 2010.

[SC23]15 June 2020 (Online)

The 23rd IRDR SC meeting was held in virtual format due the COVID-19 Pandemic. As a result of the delays arising therefrom, ISC announced the extension of the IRDR programme to 2021 to complete its planned tasks for 2020. Updates were provided on the main tasks of IRDR, namely the IRDR Compilation, IRDR Conference 2020 and the Global Research Agenda on DRR. The Hazard Terminology and Classification Technical Report was presented, in which IRDR's contributions were noted and appreciated.

[SC24]10 November 2020 (Online)

The 24th IRDR SC meeting presented the draft Executive Summary of the IRDR Compilation; conducted brainstorming session to obtain comments and suggestions from the IRDR Community on its updated Research Agenda. Finally, the meeting agreed to postpone the IRDR Conference to 2021 and confirmed that it would be organised in a virtual format.

◆ IRDR National Committees (NCs) and Regional Committee (RC)

Over time, a total of 13 IRDR National Committees (NCs) and one Regional Committee (RC) have

been established to support and supplement IRDR's research initiatives, and help to establish or further develop crucial links between national disaster risk reduction programmes and activities within an international framework. NCs and RC helped foster the much-needed interdisciplinary approach to disaster risk reduction within national scientific and policy-making communities, and served as important national focal points between disciplinary scientific unions and associations. The First Consultative Forum of IRDR National Committees, hosted by UK Collaborative on Development Sciences (UKCDS), was held on 11-12 November 2014 at Wellcome Trust, London, UK.

The objectives of NCs/RCs include: First, IRDR NCs/RCs are encouraged to act as mechanisms to mainstream integrated research into disaster risk reduction efforts at national and regional on an institutionalized basis, to enhance the coordination and cooperation among multi-stakeholders for the sustainability of the integrated research, and to improve the capacity of countries and regions in the field of disaster risk reduction. Second, IRDR NCs/RCs are to serve as focal point to promote IRDR-related research initiatives of host countries, and to enhance the links between national and international disaster risk research programmes and activities. Third, IRDR NCs/RCs are to, in conjunction with IRDR SC, IPO and IRDR partners in pursuit of IRDR objectives, identify research priorities, develop research plans, and implement programmes and other activities to achieve IRDR goals.

In support of IRDR's SC, IRDR NCs/RCs are expected to undertake the following activities:

- Foster and support participation in IRDR on the part of institutions and individual scientists;
- Serve as the national or regional focal point for IRDR;

- Foster networking and collaboration among domestic, regional and international disaster risk reduction science and technology activities;
- Improve scientific knowledge and enhance the integration of science in disaster risk reduction planning, policies and programmes domestically, regionally and internationally;
- Support efforts to update and report on national and regional disaster risk reduction activities aligned with the Hyogo Framework of Action's strategic priorities, with emphasis on the science and technology activities and engage in the discussions for the post-2015 regime on disaster risk reduction and contribute to the national or regional discussions for other relevant global negotiations (climate change adaptation, earth systems, etc.);
- Provide scientific advice to policy-makers, taking into consideration on national and regional disaster risk reduction initiatives;
- Assist in fundraising for IRDR activities and projects.

Current NCs

IRDR Australia

Home Institution: Bushfire & Natural Hazards Cooperative Research Centre (BNH CRC)

IRDR Canada

Home Institution: Science and Technology Working Group, Canada's Platform for Disaster Risk Reduction

IRDR China

Home Institution: CAST

IRDR Colombia

Home Institution: National Committee of Disaster Risk Knowledge, National Unit for Disaster Risk Management of the Presidency of the Republic of Colombia (Unidad Nacional de Gestión del Riesgo de Desastres, UNGRD)

IRDR France

Home Institution: Scientific Council, Association Française Pour la Prévention des Catastrophes Naturelles (AFPCN)

IRDR Germany

Home Institution: German Committee for Disaster Reduction (Deutsches Komitee Katastrophenvorsorge e.V. – DKKV)

IRDR Indonesia

Home Institution: Indonesia Institute of Sciences (LIPI)

IRDR Iran

Home Institution: International Institute of Earthquake Engineering and Seismology (IIEES)

*IRDR Iran is a group of eight Iranian research institutes and scientific associations. These are the:

- International Institute of Earthquake Engineering and Seismology (IIEES) – coordinating institute for IRDR Iran
- Iranian Earthquake Engineering Association (IEEA)
- Disaster Management Research Institute of

Shakhesh Pajouh (DMRISP)

- Iranian Sociological Association (ISA)
- Water Research Institute (WRI)
- Iranian Water Resource Association (IR-WRA)
- Disaster and Emergency Health Department at Tehran University of Medical Science
- Tehran Disaster Management and Mitigation Organization (TDMMO)

IRDR Japan

Home Institution: Science Council of Japan (SCJ)

IRDR Nepal

Home Institution: National Reconstruction Authority of Nepal

IRDR New Zealand

Home Institution: Natural Hazards Research Platform (NHRP)

IRDR the Republic of Korea

Home Institution: National Disaster Management Research Institute (NDMI) in Ministry of the Interior and Safety

IRDR the USA*

Home Institution: Natural Hazards Center (NHC), Institute of Behavioral Science, University of Colorado at Boulder

Note: IRDR the USA is a 'centre of centres' taking advantage of the research capacities of university-based centres that specialise in different aspects of hazards and disasters and that represent diverse disciplines.

Current RC

IRDR welcomed its first RC in 2013, in the Latin American and Caribbean (LAC) region, through the newly formed ICSU Regional Office for Latin America and Caribbean (ICSU-ROLAC) Scientific Steering Committee for IRDR in LAC.

The roles taken and contributions made as well as the challenges encountered and lessons learnt by the IRDR NCs and RC are reported in the

Chapter 2 and Chapter 3 of the Compilation. It is expected that, should IRDR be continued for another substantial duration, e.g. through 2030, IRDR NCs and RC and scientists behind would continue play their active roles. However, since the subject of IRDR programme governance and operational management are addressed in this Chapter, one need to step back and look at the overall position and roles of IRDR NCs in IRDR with a more critical eye.

The level of exchange between IRDR NCs and IRDR SC and IPO are seen as limited. Since 2015, IRDR NCs have been participating in IRDR through their attendance of IRDR SC meetings but such participation is voluntary in nature, and we have observed a reduction in the numbers of attendants therefrom. Some NCs have also raised the issue of their position at IRDR SC meetings. This is a good point: while NCs are very much encouraged to participate in all IRDR SC meetings, they are not equipped with voting power for the planning and decisions of IRDR. As an international scientific programme which has clear roles in interacting at national level for policy improvement, the position of IRDR NCs in IRDR's planning and decision making need to be further reviewed and re-considered.

IRDR is mandated and committed to bringing together DRR research communities for

cooperation, but so far there is no regular mechanisms for IRDR NCs to meet and exchange among themselves, except for the limited opportunity of IRDR SC meetings. It is now clear that IRDR should have had other regular conferences (as it was during the initial years of the programme) to bring together entire IRDR community for exchange. This has also led, or at least partially contributed to, the relatively low visibility of IRDR NCs in international community, with perhaps a few exceptions. In addition, the reporting mechanism for NCs have not been effective in facilitating the information flow between NCs and IRDR SC and IPO, and this certainly has affected IRDR's scope of outreach.

IRDR ICoEs

Over last ten years, a total of 17 institutions have joined IRDR as ICoEs. They have provided regional and research foci for the IRDR programme. In particular, each established ICoE enabled regional scientific activities through geographically-focused contributions based on more localised inputs, and by being visible centres of research, motivate participation in the IRDR programme. Chapter 2 and Chapter 3 have evidenced the contributions of IRDR ICoEs as providing critical institutional research capacity, acting as producers of knowledge and important actors to advance the IRDR agenda within the Sendai Framework.

Generally, each ICoE contributes to IRDR's main principles, objectives and studying domains and to promote and disseminate widely the IRDR concepts, approaches and methodologies. ICoEs not only are committed to supporting the SC and IPO in facilitating IRDR, but also to developing a global network for IRDR knowledge, expertise and researchers. Specifically, ICoEs follow 3 objectives in their IRDR activities. Firstly, each ICoE research programme embody an integrated approach to disaster risk reduction that directly contributes to the IRDR Science Plan and its objectives: the scientific characterization of natural and human-

induced environmental hazards, vulnerability and risk; the understanding of decision-making in complex and changing risk contexts; and the reduction of risk and curbing losses through knowledge-based actions. The ICoE also contributes to the cross-cutting themes: capacity building; case studies and demonstration projects; and assessment, data management and monitoring. ICoE and IRDR projects work together to contribute towards IRDR's global legacy. In particular, the ICoE enables regional scientific activities through geographically-focused contributions based on more localized inputs and, by being a visible centre of research,

motivates participation in IRDR. Secondly, ICoEs support IRDR in developing and strengthening powerful partnerships with UN Agencies and organizations at international, regional and national levels working on disaster risk, which provides a reserve of intelligent and informational resources for IRDR. Thirdly, ICoEs further extend their core function as facilitators of IRDR and acts as international centres providing support for decision-making, promulgating the achievements of DRR research, and fostering senior DRR researchers and practitioners. All the above with a view of ensuring a shift of focus towards disaster risk reduction in research and policy-making.

In order to comply with the objectives of IRDR Science Plan and its own objectives, the roles of ICoEs can be broadly categorized as below:

- Conduct IRDR at local, regional, and global scale, meeting the objectives of 4 IRDR Working Groups;
- Provide specifically-designed technical cooperation on disaster risk and reduction management for policy and decision-making;
- Provide technical support for formulating regional, national or local disaster risk reduction programs based on integrated research;
- Promote IRDR research by conducting regular trainings, workshops or other activities for disaster managers, decision- makers, and junior researchers;
- Facilitate and participate in IRDR events;
- Contribute to disaster risk researchers' networks and/or platforms

◆ Current ICoEs (in order of establishment):

1. IRDR ICoE-Taipei

Home Institution: Academy of Sciences located in Taipei, China

2. IRDR ICoE in Vulnerability and Resilience Metrics (IRDR ICoE-VaRM)

Home Institution: Hazards and Vulnerability Research Institute (HVRI), Department of Geography, College of Arts and Sciences, University of South Carolina, Columbia, South Carolina, USA

3. IRDR ICoE in Community Resilience (IRDR ICoE-CR)

Home Institution: Joint Centre for Disaster Research (JCDR), Massey University, Wellington, New Zealand

4. IRDR ICoE in Understanding Risk & Safety (IRDR ICoE-UR&S)

Home Institution: Disaster Risk Management Task Force, Institute of Environmental Studies (Instituto de Estudios Ambientales – IDEA), National University of Colombia (Universidad Nacional de Colombia), Manizales City, Colombia

5. IRDR ICoE for Risk Education and Learning (IRDR ICoE-REaL)

Home Institution: Peripheri U (Partners Enhancing Resilience for People Exposed to Risks) Consortium, Research Alliance for Disaster and Risk Reduction (RADAR), Department of Geography and Environmental Studies, Stellenbosch University, South Africa

6. IRDR ICoE in Risk Interpretation and Action (IRDR ICoE-RIA)

Home institution: Centre for Integrated Research on Risk and Resilience (CIRRR), Department

of Geography, King's College London (KCL), London, UK

7. IRDR ICoE for Disaster Resilient Homes, Buildings and Public Infrastructure (IRDR ICoE-DRHBPI)

Home Institution: Institute for Catastrophic Loss Reduction (ICLR), Western University, Toronto, Canada

8. IRDR ICoE on Critical Infrastructures and Strategic Planning (IRDR ICoE-CI&SP)

Home Institution: Institute for Spatial and Regional Planning (IREUS), Department of Civil Engineering and Environmental Management, University of Stuttgart, Germany

9. IRDR ICoE for Collaborating Centre for Oxford University and CUHK (CCOUC) for Disaster and Medical Humanitarian Response (IRDR ICoE-CCOUC)

Home Institution: Collaborating Centre for Oxford University and CUHK (CCOUC) for Disaster and Medical Humanitarian Response

10. IRDR ICoE for Disaster Risk and Climate Extremes (IRDR ICoE-SEADPRI-UKM)

Home Institution: Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM), the National University of Malaysia

11. IRDR ICoE for National Society for Earthquake Technology- Nepal (IRDR ICoE-NSET)

Home Institution: National Society for Earthquake Technology-Nepal

12. IRDR ICoE in Spatial Decision Support for Integrated Disaster Risk Reduction (IRDR ICoE-SDS IDRR)

Home Institution: Faculty of Geo-Information Science and Earth Observation (ITC), The University of Twente

13. IRDR ICoE on Transforming Development and Disaster Risk (IRDR ICoE-TDDR)

Home Institution: SEI Initiative on Transforming Development and Disaster Risk

14. IRDR ICoE on IRDR Science (IRDR ICoE-IRDRS)

Home Institution: Disaster Risk Science Institute, The Australian National University

15. IRDR ICoE on Resilient Communities & Settlements (IRDR ICoE-RCS)

Home Institution: Visvesvaraya National Institute of Technology (VNIT), India

16. IRDR ICoE on in Disaster and Climatic Extremes (IRDR ICoE-DCE)

Home Institution: Department of Geography, University of Peshawar, Pakistan

17. IRDR ICoE on Risk Interconnectivity and Governance on Weather/Climate Extremes Impact and Public Health (IRDR ICoE-RIG-WECEIPHE)

Home Institution: Fudan University, China

The records show that, over last five years, the level of participation of IRDR ICoEs in IRDR SC meetings are higher and more dynamic (as compared to many IRDR NCs). However, vis-a-vis programme governance, there is a similar concern to NCs, with the role of ICoEs in programme development planning and decision making unclear. This needs to be further reviewed and improved in the process of development of new global research agenda and the associated implementation mechanism(s).

◆ IRDR WG

IRDR established six Working Groups (WGs) under the IRDR SC. These WGs are organized and operated to carry out research to meet IRDR's research objectives and cross-cutting themes with a particular emphasis in formulating new methods

in addressing the shortcomings of current disaster risk research. In recent year, IRDR WGs have opened for ICoEs and Young Scientists to join.

AIRDR

The AIRDR project was set up to undertake the first systematic and critical global assessment of IRDR. The enormity and complexity of disaster risk requires knowledge from the natural, social, and health sciences, as well as engineering, all operating in an integrative fashion, not as separate disciplines examining one aspect of the problem. Such a synthesis of perspectives is not easy, but is vital in producing the new understanding of disasters and their impacts and in achieving the objectives of IRDR.

Disaster Loss Data (DATA)

The Disaster Loss Data (DATA) project was set up to study issues related to the collection, storage, and dissemination of disaster loss data. Recognising the need for standards or protocols to reduce uncertainty in disaster loss data, the working group intends to establish an overall framework for disaster loss data for all providers, to establish nodes and networks for databases, and to conduct sensitivity testing among databases to ensure some level of comparability.

Forensic Investigations of Disasters (FORIN)

The Forensic Investigations of Disasters (FORIN) project's mission is to develop, disseminate and implement a radical new approach in disaster research that seeks to identify and explain the underlying causes of disasters, including the growth in magnitude and frequency of very large disaster events. It is intended that this research paradigm will lead to greater in-depth understanding and more enlightened and effective disaster risk reduction practices and policies.

Risk Interpretation and Action (RIA)

The Risk Interpretation and Action (RIA) project focuses on the question of how people — both

decision-makers and ordinary citizens — make decisions, individually and collectively, in the face of risk. Decision-making under conditions of uncertainty is inadequately described by traditional models of 'rational choice'. Instead, attention needs to be paid to how people's interpretations of risks are shaped by their own experiences, personal feelings and values, cultural beliefs and interpersonal and societal dynamics.

DRR, CCA and SDGs

This working group focuses on DRR research in the coherence of the Sendai Framework, Paris Agreement and SDGs. Climate change is changing the characteristics of disasters. The world has adopted the Sendai Framework to help deal with disaster impacts through strengthened governance, better risk knowledge, resilience investment, and preparedness and recovery and reconstruction. The Paris Agreement on Climate Change is the international framework adopted to deal climate change. There are many strategies to deal with climate change, mostly through strengthening institutions, planning and implementation of strategies for adaptation. DRR has also been suggested as the 'first line of defense' for Climate Change Action (CCA), as they both advocate for vulnerability reduction, strengthening resilience, and integrations of climate risks considerations within development. In addition, the SDGs were adopted in 2015, and explicitly recognized the links between disasters and climate change, in particular in goals 11 on cities and 13 on climate change. It is important that strategies to deal with DRR and CCA also meet the SDGs strategically. While these 3 international frameworks are clear in terms of their intended outcome, the way by which the progress can be measured are still unclear. Capacity for research and scientific engagement related to DRR-CCA-Development also need to be strengthened. It is important to encourage scientific research and engagements within developing countries, in particular in Asia and Africa.

Nation's Synthesis on Disaster Risk Reduction

Supported by Science and Technology

This working group aims to promote dialogue between stakeholders and the science & technology community. The WG proposes that each country should develop an online information sharing system under international cooperation to share synthesized information of science and technology among a broad range of stakeholders. With this information infrastructure, the national platform of each country should review the status and issues of the current DRR efforts that they have implemented based on scientific knowledge. The national platform should then be used to discuss how DRR should be carried out for the country, and design practical measures to be implemented from a holistic viewpoint. All these processes should contribute to the enhancement of dialogue between the two parties, which will result in the production of guidelines and synthesis reports.

◆ IRDR Young Scientists Programme

The IRDR Young Scientists Programme is an initiative started in 2016 to promote capacity building of young professionals and to encourage them to undertake innovative and needs-based research which strengthens science-policy and science-practice links. The objectives are to:

- Increase awareness among young scientists regarding implementation of the Sendai Framework and provide opportunities for further engagement through the Young Scientists Program on DRR;
- Collate existing research knowledge on DRR and identify research gaps and priorities in relation to the Sendai Framework Priorities for Action;

- Identify opportunities to fund continued multi-disciplinary research by young scientists and early-career researchers;
- Provide technical support to promising young researchers in DRR fields;
- Build and foster strong and dynamic networks among worldwide experts and institutions in DRR fields;
- Develop, over time, a community of high-quality young professionals that can provide support for policy making decisions related to DRR

With 4 rounds of the programme completed, already 162 young researchers from 46 countries have been involved, including 43 female researchers. The academic background of these young scientists ranges from traditional disciplines (such as Geography, Biology, Engineering, Computer Science, Architecture, Anthropology, Economy, and Law) to the integrated and cross-cutting disciplines (such as Disaster Risk Management, Climate Change and Adaptation, Social Resilience, DRR Communications, Disaster and Emergency Health, and Disaster Nursing). The application proposals accepted by IRDR focus on the mechanisms of disaster processes, and the development of a comprehensive understanding of disaster risk, community resilience, and public awareness. Some 20 papers from IRDR YSP have been collected and will be included in this Compilation.

4.2

Institutional capacity gaps: views and comments from members of IRDR Community

The institutional capacity building in IRDR is mainly conducted through NCs and ICoEs. NCs and ICoEs are established on the basis of research institutes and organisations. They are the knowledge producers and DRR practitioners within national and regional contexts. They serve as think tanks and meet the integrated research requests at the regional, thematic and global levels. However, the current distribution of IRDR NCs and ICoEs is lacking regional balance. In addition, there are critical research domains and subjects in DRR that current NCs and ICoEs have not yet covered. More efforts are still needed to fill these institutional capacity gaps.

The following two boxes presented the comments from NC Iran and NC Germany regarding the institutional capacity gaps at regional and national levels.

◆ IRDR NC of Iran

Disaster risk and resilience management and governance in Iran is facing very similar challenges as faced by many other regions in the world, namely: the gap between knowledge and implementation, between science and policy, which remains rooted in the risk-based decision-making process. Some of the recommendations are:

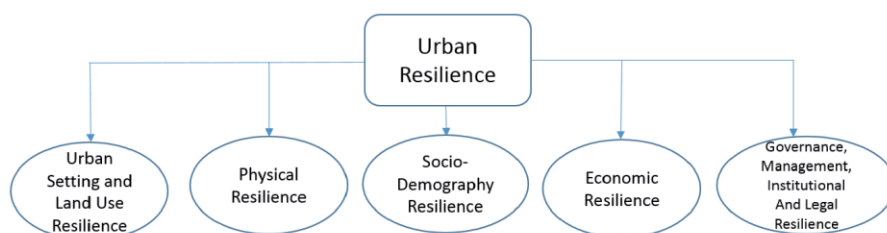
1. Integration of all DRR programs, policies, regulations, institutions, and stakeholders by creating synergy through systematic and NEXUS approach. All governments, including

Iran, should form a high-level Risk and Resilience Science Advisory Body to look into the entirety of prevailing policies and start the process of integration and harmonization of such policies into a unified long-term policy and order. This process can be done gradually, in four steps: 1) creating cooperation within sectors, 2) creating synergy between sectors, 3) integrating all sectors in one system with inter-disciplinary cooperation, and ultimately 4) creating nexus integration of all sectors. This is the principal of good governance, where elements of a system should work together in order to solve the complex problems of being safe against natural disasters;

2. Optimization of DRM and Resiliency Objectives: Given that limited available resources are often distributed across too many activities and projects; and that achieving preparedness and resilience for mega-disasters is almost impossible; it is recommended that:

- The resilience and disaster response goals should be set in a fashion that prepare the society for encountering more frequent and probably smaller disasters. At the same time, planning for less frequent and more severe events should be started. The target goals and acceptable risk level should be defined based on the IRRM; and,
- A process for optimizing resource allocation to projects and activities that are doable and achievable should be followed. Funds and budget should be targeted to the

- reduction projects with lower costs and higher effectiveness;
3. Creation of demand for safety by promoting risk communication: Risk communication is essential for raising awareness about disaster risk in order to achieve resilience, particularly with regards to earthquakes, fires and floods. Without opening people's eyes on the fact that they are at risk, all efforts for enhancing preparedness and taking preventive actions would barely succeed. People need reliable information from reliable sources in order to trust and cooperate with the government in risk reduction programs. Reliable hazard maps providing graphical information on the risks of disasters and information on evacuation routes, shelters, and response resources; as well as providing religious and socio-economic incentives are effective tools for raising risk awareness and public participation;
 4. Formulating risk-based disaster response, recovery and reconstruction;
 5. Avoiding the creation of new risk through safe and resilient planning, designing, constructing, rehabilitating and comprehensive and integrated capacity building;
 6. Establishing procedures for monitoring urban resilience, evaluating the progress thereof, and for measuring improvements in the resilience of urban areas through implementation of risk reduction programs. To this point, an index-based monitoring system has been proposed based on the pertinent parts of the Sendai Framework (as the newest adopted international strategy for disaster risk reduction). An indicator system for urban resilience has also been proposed. This Indicator system has a hierarchical structure and has been extended according to a rational lookout to cover all involved parts of a city. It is based on the main contribution parameters as shown below.



◆ IRDR NC of Germany

Major gaps are found when looking at implementation on the ground. Municipalities often do not have sufficient resources to address CCA issues, even less so the complexities of bringing together CCA and DRR in a coherent manner. Both aspects need to be integrated in land use planning (such as regional plans of the federal states and urban development plans). To help local and regional actors with the harmonization of DRR and CCA, the federal government needs to invest in capacity building and awareness raising activities, especially at the local level. Finally, to enhance access to equal

information on funding opportunities on CCA and DRR, information should also be made available to actors who might not belong to the CCA and/or DRR communities per se.

◆ IRDR NC of Colombia

1) National levels

Although the Technical Advisory Committee for Risk Awareness (CTACR, in Spanish) has been in operation since 2014, only until 2020 it condensed the essential information and approved the strategy. It means it is necessary the development of future projects and initiatives in the four strategic lines previously established:

- Science, technology, and innovation promotion.
- Communication of advances in science and technology. Promotion of human capital from the National System of Science, Technology, and Innovation
- National-level institutional integration

2) Regional and sub-regional

It is necessary to strengthen the collaborative work level between the National Disaster Risk Management System, the National Science, Technology and Innovation System, the National Competitiveness System, and the National Environmental System to optimize resources for developing science, technology, and innovation products at regional and sub-regional level. Such a process requires regarding academia's capacities, the scientific community, the economic sector, the technical institutions, the community, and the public sector. Finally, it has to increase synergies with the territorial level to guarantee effectiveness in implementing the risk management policies.

◆ IRDR ICoE-VaRM

Uneven institutional capacity is a key challenge for the IRDR. The lack of coordination among members of the IRDR-extended family, generally a by-product of having no centralized financial support for the ICoEs, for example, will continue to thwart the goal of an integrated science network focused on disaster risk reduction from local to national scales. Until there is some minimal amount of centralized support for the ICoEs from the IRDR IPO (or some other entity), they will continue to operate as "independent" agents with minimal collaboration among them. Without some form of matching funds, for example, true IRDR will only be aspirational, not realized.

◆ IRDR ICoE CR

New Zealand has adopted a National Resilience Strategy that aligns with the Sendai Framework. The need to enhance its global partnerships has

been acknowledged at the national level. The initiative to strengthen the partnership between a number of the ICoEs is welcomed and should be furthered. Additionally, the ICoE is also well aware of the need to enhance engagement with regional partners and connect with nearby countries, communities and institutions who may have had limited connection to the IRDR efforts over the past decade.

◆ IRDR ICoE CCoUC

Institutional capacity gaps echo the backgrounding of health in the research and practice scenes. Taking China as an example, its environmental degradation and rapid urbanisation make China one of the most severely affected countries in terms of the number of disasters, human casualties and economic losses. As one of the most important indicators of disaster risk reduction, disaster-related deaths have been reduced in recent years due to the improvement of disaster management capacity. As key components of primary prevention under the Health-EDRM framework, the emergency medical and public health response and disease surveillance system have been largely strengthened. However, the health sector in China was often only involved in the later stages of disaster response. Although the newly established Ministry of Disaster Management of China has integrated the duties previously scattered in many government departments, the health sector remains not directly included in its structure. Preventive measures including primary care resilience, health infrastructure safety codes and hospital emergency plans are still not in place in many areas of the country. There is an urgent need to build a framework and mechanisms to ensure a better involvement of health in China's disaster management system, as highlighted by the Health-EDRM framework (Chan and Shaw, 2020).

The current fight against the COVID-19 pandemic has made the need for future DRR research agenda to enhance health-related DRR abundantly clear. ICoE-CCoUC's current work

on COVID-19 is yet another attempt to put the Health-EDRM framework into use in research, practice and policy.

◆ IRDR ICoE REaL

- PERIPERI U has struggled to find and secure long-term funding contracts to support its partners and their initiatives. PERIPERI U's central funding from USAID came to an end in 2019, and with limited opportunities to replace such funding, PERIPERI U activities such as its academic programmes, research, short course strategic engagement and advocacy will be limited and potentially be forced to close.
- Despite significant growth in student enrolment body, a lack of student funding remained a major constraint, especially at post-graduate levels. Many students continued to struggle to support themselves financially, with funding obstacles delaying study completion or forcing student withdrawal from academic programmes. With limited funding available to the PERIPERI U, partners are unable to provide scholarships or financial support to their students to ensure they can continue and complete their studies.

◆ IRDR ICoE ITC

- How to effectively involve relevant stakeholders in recovery planning and execution. [often people create facts on the ground (rebuilt slums etc.) before decision makers get any planning done]
- Give risk reduction (including climate risk) more attention in spatial planning curricula and professional (life-long) learning activities

◆ IRDR ICoE-SEADPRI-UKM

Linking young scientists working on disaster risk reduction and climate change adaptation

The ICoE-SEADPRI-UKM strongly supports engagement with youth and young professionals. Early career scientists from various disciplines are involved in the crosscutting field of disaster risk reduction and climate change adaptation. The engagement of youth in science and technology is a powerful enabler for creating resilient communities. This is also conveyed in the Sendai Framework and SDGs, both of which advocate the involvement of multiple stakeholders including youth, to ensure success.

In 2017, the ICoE and Asian Network on Climate Science and Technology (ANCST) started the "Malaysia-Window-to-Cambridge at UKM" initiative with funding from the Cambridge Malaysian Education and Development Trust, in association with the Malaysian Commonwealth Studies Centre (MCSC/CMEDT). The initiative unearthed a talent pool of some 80 high-calibre "ANCST Young Scientists" in Asia, who benefitted from training workshops and events convened by ANCST in the region and are now connected through the ANCST Special Topic Group on Young Professionals in DRR and Climate Change. The young scientists of ANCST, with broader engagement from the region facilitated by the IRDR IPO, are now actively engaged in supporting the IPCC in its Sixth Assessment cycle. This has been made possible through the collaboration of the ICoE with ANCST, the Asia-Pacific Network for Global Change Research (APN), the International Science Council Regional Office for Asia and the Pacific (ISC-ROAP), as well as other partners. The collaborating agencies have convened several events in the region to increase the participation of scientists, particularly early career scientists, in the IPCC process and improve coverage of scientific information for sub-regions such as Central Asia, West Asia, Southeast Asia, Hindu-Kush Region and the Pacific Islands, which were not well covered in the Fifth Assessment Report of the IPCC (Figure 4-1).

Figure 4-1: In 2018, ICoE-SEADPRI-UKM and ANCST partnered with APN, ISC-ROAP and other parties, to bring together young scientists working on DRR and climate change adaptation and link them to IPCC authors, at the Workshop on Status of Climate Science and Technology in Asia, held in Kuala Lumpur, Malaysia.



The ANCST Special Topic Group incubated and established U-INSPIRE Malaysia@UKM in 2019, which is now part of the regional U-INSPIRE network championed by UNESCO's Regional Science Bureau for Asia and the Pacific. The launch of U-INSPIRE Malaysia@UKM saw the participation of representatives of U-INSPIRE networks from Indonesia, India, Pakistan, Nepal and The Philippines, who shared experiences and ongoing initiatives from their respective countries (Figure 4-2). Through the work of ANCST Special Topic Group on Young Professionals in DRR and Climate Change, U-INSPIRE networks (via the U-INSPIRE Alliance platform) are now linked to other youth groups such as the IRDR Young Scientists, the United Nations Major Group for Children and Youth (UNMGCY), and the Children in a Changing Climate coalition (CCC), helping bridge DRR and climate change adaptation. ANCST also conducted the workshop "Building

Disaster and Climate Resilience in Cities in Kuala Lumpur" on 15-16 October 2019. This workshop involved the participation of experts from the UNDRR Asia-Pacific Science, Technology and Academia Advisory Group (APSTAAG), with the purpose of taking stock of new scientific knowledge on tropical cities. In addition to building capacity, the workshop was intended to marshal future research and lay the foundation for supporting the IPCC Special Report on Climate Change and Cities in the upcoming Seventh Assessment cycle. A total of 141 participants representing multiple disciplines and 14 countries shared the latest findings for cities, including modelling of geophysical and atmospheric hazards, critical infrastructure resilience and pathways for building disaster resilience as climate changes. Young scientists were exclusively targeted as participants and a few were selected to present posters on their ongoing work.

Figure 4-2: In 2019, ICoE-SEADPRI-UKM, ANCST and partners launched U-INSPIRE Malaysia@UKM, which is now linked to a significant network of active youth groups, to empower young scientists to bridge DRR and climate change adaptation at the local level.

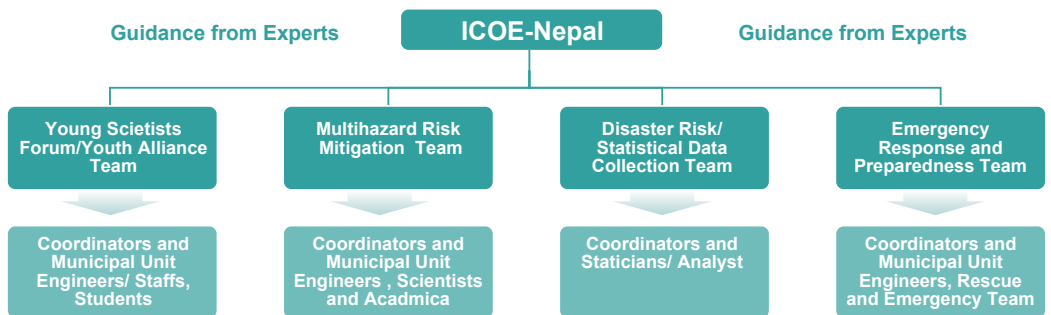


◆ **IRDR ICoE NSET**

IRDR ICoE-NSET will continue to focus on embedding science and technology in disaster risk reduction efforts of Nepal by establishing thematic hubs at the municipality levels. The hubs will have members from different institutions and include both state and non-state actors, and will work towards providing definite conclusions that

may be then applied, either by adapting global knowledge into local context, or by conducting solution-finding focused research that would be helpful for evidence-based decision making and for encouraging investment in DRR. The ICoE expects to pilot 2-3 hubs in the next year. Though their foci will differ, all will work to support the following objectives:

Figure 4-3: Future Strategy of ICoE-Nepal showing hubs



- To promote the use of science and technology in the assessment of disaster and climate hazard and risk in the municipal jurisdiction and help mainstream efforts into the ongoing development works.
- To promote the involvement of youth in municipal development activities, tying up with academic institutions blend knowledge and bring tangible outcome (Dixit, n.d.).

◆ IRDR ICoE RIG-WECEIPHE

Integrated researches are very much needed for a better understanding of the risk interconnectivity. Therefore, it is critical to establish an institutional framework in support of these integrated efforts. One of the key issues for establishing the framework is to strengthen multi-stakeholder partnerships, to bridge academic communities, government authorities, development organizations, private sectors and NGOs to put into practice of the value chain “Science in Service to Society”. As the first ICoE in the Chinese

Mainland, ICoE RIG-WECEIPHE is willing to make its contribution in this regard and will work with WMO MAP-AQ Asian Office Shanghai and other IRDR ICoEs to be a liaison hub to facilitate the efforts to enhance the integrated research on the interconnectivity risks associated with climate change (weather/climate extremes in particular), air pollution and public health, the capacity development, technical transfer and wider engagement for better governance in achieving sustainable and resilient development.

Therefore, we call for the development of the network and alliance together with multi-stakeholder in support of implementation of the research agenda to connect the high prioritized actions set by global agendas, such as “race to zero” for achieving goals of carbon neutrality in the mid-21st century, and one health for addressing epidemic disease through co-designing, co-initiating requirement driven R&D and co-organizing joint actions for better science-based governance.

4.3

Assessment and important recommendations from the mid-term review of 2016 and the Action Plan 2018-2020

The co-sponsors of IRDR and the host commissioned a mid-term review for IRDR in 2016. This was a most critical action as the review identified the weaknesses and challenges of IRDR at the mid-stage of its implementation, allowing it to improve in a timely manner. Many

improvements have been made since as a result, but the essence of the 2016 assessment and recommendations remain valuable and stimulating even today. It is hence included below for reference.

Mid-term Review

As the Review is intended to inform the unfolding of the next 4-5 years phase of the ten-year IRDR Program ('IRDR'), the seven-member Review panel focused their work purposefully on identifying critical areas for improvement.

The Review panel's overall assessment is that upon its establishment, IRDR was a well-conceptualized, timely and innovative - potentially even pioneering - initiative in the increasingly important domain of disaster risk reduction. Its design was ambitious. It reflected the effort needed to bring to fruition a global research program that had to promote and demonstrate new ways of thinking and working in order to influence policies and practices that benefit societies and vulnerable communities around the world.

However, decisions during the inception phase led to a pared down program that has yet to convince that IRDR's initial objectives can be achieved by the end of its ten-year lifetime. Despite the commitment of the excellent scientists on the Scientific Committee, their

active engagement in important global and regional initiatives, four main research projects, and the establishment of a network that provides an IRDR footprint in 30 countries around the world (by June 2016), progress has been slow, and the program foci and results too limited to meet the goals of the Science Plan and the expectations created by the program.

The Review panel found the situation to be the result of a confluence of several key factors: decisions during inception, prompted in part by challenges in how such Interdisciplinary Bodies are set up; fast turnover in Executive Directors at the International Program Office (IPO) in Beijing (the first such IPO established outside Europe); and a series of governance, leadership and management weaknesses, including a failure to raise sufficient program funds to give life to its strategic intent.

The Review panel is convinced that IRDR remains a very worthwhile endeavour. In principle, it maintains a significant niche and comparative advantage that continue to provide

a good value proposition for its stakeholders, both within and outside the scientific arena. It remains reasonably well positioned in an important area of work, and has been making fair progress in spite of significant obstacles. Many useful lessons have been learned, and there is goodwill among all parties concerned - the Scientific Committee, the main donor (CAST), the IPO, its host organization, the Institute of Remote Sensing and Digital Earth of the Chinese Academy of Sciences (RADI/CAS), and the co-sponsoring organizations - to collaborate to accelerate IRDR's path towards impact on science, policy and practice.

However, if success is to be visible by 2020, several key challenges need to be resolved with a sense of urgency as well as strong leadership. The Review panel shaped their recommendations around these challenges, and recommends that the following five aspects be addressed through dynamic cooperation among all key stakeholders, including the three co-sponsors, who are asked to take on a stronger role in future:

1. Adjust the program scope and direction. Reshape the program by building on the foundation laid in the first phase - strengthening and redirecting its efforts in order to achieve the objectives set out in the original Science Plan - and position it further in the 'disaster risk reduction for sustainable development' space. This will require an undertaking to expand the time horizon of the program 2025 if progress is satisfactory over the next few years - thus with ongoing support subject to strong accountability measures.
2. Improve the business model. Change IRDR's business (strategic and resourcing) model by moving it away from the unsuccessful project-driven, ad hoc approach to a more strategic, programmatic approach, with concerted efforts to explore and tap unconventional sources of funding.
3. Sharpen governance. Adjust the governance system to remove conflicts of interest, support stronger leadership, ensure proper oversight and appropriate lines of accountability, engage the co-sponsors, and use the strengths of each component of IRDR in an appropriate way to relieve the very significant burden of work on the Scientific Committee.
4. Improve management. Put useful monitoring, evaluation and knowledge management systems in place that can support a more strategic, adaptive, evidence-informed management approach for the whole IRDR 'family'. Enhance branding and communication systems to ensure clear program boundaries and greater, more targeted visibility. Ensure meaningful and respectful relationships between the Scientific Committee, the IPO, the program donor and host organizations, as well as the IRDR network nodes, the International Centres of Excellence (ICoEs), and its Regional and National Committees.
5. Move towards collective impact. Mobilize the different components and nodes of the IRDR network, based on the relationships built up over the years, to align and collaborate as a (global) 'action network' - based on solid, long-term partnerships wherever this makes strategic sense. Make use of the opportunity to do context-sensitive, innovative comparative work, respectful of different conditions and cultures, that can strengthen science for policy and practice.

In response to the mid-term review, efforts were made by IRDR SC and IRDR IPO under the direction of its co-sponsors and host organizations. Internally in IRDR, there were extensive discussions and suggestions for strategic actions. In 2018, these efforts resulted in the establishment of IRDR Action Plan 2018-2020 with specific actions and time frame. Since its adoption, IRDR SC and IPO have been implementing the Action Plan, whose output has already been reported in Chapter 2 and 3 of this Compilation. The Action Plan 2018-2020 has proved to be clear, easy to follow and more accountable.

Since 2016, a significant part of above five key recommendations from the mid-term review has been addressed. For instance, an oversight committee consisting of the ISC, UNDRR, CAST, CAS and AIR, and the Chair of IRDR SC and ED of IRDR was established, meeting once each year for overall programme coordination. This has helped sharpen the governance and steer the programme's implementation. Progress has also been made in terms of mobilizing different

components and notes of the IRDR network, and IRDR SC meetings are open to all IRDR NCs and ICoEs, as well as the chairperson of each IRDR Working Group.

At the same time, it is also noted that some of the 2016 recommendations are still not fully implemented. The adjustment of programme scope and direction, for instance, is a process which was only started at the end of 2019 after GP2019, when the co-sponsors decided to develop a new global research agenda on disaster risk and push forward an integrated science on risk (which to IRDR may become one of the implementation options in the future). As to change of business model and relieve the IRDR SC's burden on programme management, that was achieved in part by letting the IPO handle most of the operational issues. However, the institutional arrangement for empowerment of other IRDR components entities in programme governance, including planning and decision making, remain an issue. This should be addressed in IRDR's next phase.

Table 4-1. IRDR Action Plan 2018-2020

	Action		Description	Deliverables	Lead Group	Outcomes & Impact	Timeframe	
Improve Governance of IRDR	1	The Coordination Group meeting	An annual meeting of the Coordination Group	Strategic decisions and recommendations to IRDR SC and IPO	ISC Secretariat	Improved programme development policy and coherence & communication among co-sponsors, SC and IPO	2019-2020	
	2	Annual donor reporting	Preparation of a comprehensive report of IRDR to the donors and co-sponsors on programme implementation	Annual report	IPO	Transparency and annual review of accountability vs IRDR goals and objectives	2018-2020	
Expand the IRDR Network and Scientific Outputs	3	Contributing toward the improvement of coherence between SFDRR, SDGs and the Paris Agreement	Mainstreaming relevant SDGs and climate targets related to DRR in IRDR WGs, NCs, ICoEs and Young Scientists	IRDR key programme components and their products with clear indications to SDGs and climate targets	SC, IPO	IRDR showcases the interconnection of SFDRR priorities and the targets with SDG targets and other UN frameworks on SD	2018-2020	
	4	Partnership development with G-STAG and Global ST partnership	Making joint effort with G-STAG and regional STAGs and be active in Global ST partnership in promoting integrated DRR research.	IRDR contribution at G-STAG, regional STAG and Global ST partnership meetings	SC, IPO in cooperation with STAG	IRDR recognized as one of main driving forces in global STI mobilization for SFDRR	2018-2029	
	5	Working Groups research plan Recompose the DATA, FORIN, AIRDR and RIA working groups by incorporating previous SC Members, ICoEs, NCs, IRDR Young Scientists and stakeholders from broader DRR community	- Revising working groups and define activities	Specific Research Plans of WG and enhanced research teams.	WG Chairs/co-Chairs, IPO	Enhanced WG outcomes	Linkage and cooperation among SC, WG, ICoE's, NC's, Young Scientist and ISC Regional Offices and UNISDR Offices improved.	2018-2020
			- Including the previous SC members workshop to take stock and reprioritize/align Integrated Research and WG's task around SFDRR and SDG.	A number of working papers from WGs and other IRDR components				
	6	WGs on SFDRR, CCA and SDG's	- Capacity Building	ICoE joint technical workshop/conference	WG reports	Working group chairs and co-chairs	IRDR position vs global climate change synergized	2018-2020
			- Promoting Integrated research approach	Creation of a New Working Group to align IRDR research and overall IRDR work to SFDRR, CCA and SDG's				

	Action	Description	Deliverables	Lead Group	Outcomes & Impact	Timeframe	
Expand the IRDR Network and Scientific Outputs	7	New case studies on IRDR	Develop case studies with reinforced WG's on Integrated Research for DR, Policy and Practice.	WG's, ICOE's, NC's, Young Sc	Capacity building and IRDR network strengthened	2019-2020	
	8	Continuation of Young Scientists Programme	Recruitment of young scientists through workshops and training activities	IPO, SC Working Groups	START partner	2018-2020	
	9	Expansion of IRDR base of experts by appointing "Associate Members" (<i>name will be changed with prior agreed TOR by the co-sponsors</i>)	Exemplary individuals in integrated DRR research and previous SC members	List of proposed new members.	IPO	Reinforce IRDR Working Groups Support for capacity building	2018-2020
	10	Support and partnership with IRDR associated projects	Three specific approved projects (DBAR DRR WG, SIDRR, NZ)	DRR databases, models, training packages and reports	IPO with specific project leaders	Concrete cases and products in support of IRDR mission and objectives.	2017 onward
	11	Support for ST Roadmap	Specific contributions to Expected Outcomes Understanding Disaster Risk (1.2; 1.4); and Strengthening Disaster	Risk Governance to Manage Disaster Risk (2.1); among others through different WG's	SC, WGs, ICOEs, NCs	Use of ST, in particular integrated research approaches, in DRR related governance improved.	2018 onwards
	12	Periodic synthesis case study. A selected team of authors to produce a short report as an exemplar of Tokyo statement outcome	Conduct a synthesis of state of knowledge on SFDRR priorities targeting 2019 Global Platform	Reports of the case study	ISC, IPO, Risk-KAN Development Team	A joint IRDR contribution toward 2019 Global Platform.	2018-2019
	13	Support selected national DRR platforms as exemplars ⁵⁸	Co-develop with UNISDR guidelines to enhance national DRR platforms in selected countries.	Initial 2020 rolled out to several by 2030	IPO with UNISDR and its regional offices	Pilot examples for the development of national DRR platforms.	2018-2020

58 This needs to be further checked. Not sure if SC members have already some countries in mind for the 'national DRR platforms'

	Action	Description	Deliverables	Lead Group	Outcomes & Impact	Timeframe	
Expand the IRDR Network and Scientific Outputs	14	Contributing to ISC's leading role in the S&T Major Group for the 2019 Global Platform	Lead and organize specific events and dialogues within S&T Major Group at 2019 Global Platform	Suggestions and recommendations of the S&T MG events	ISC, IPO, SC and some ICoEs	Advancement of S&T contributions in the implementation of SFDRR	2018-2019
	15	A specific task on operationalization of SFDRR indicators	A co-implemented task on indicators	A consolidated proposal on SFDRR indicators	DATA Group	Contribution to SFDRR	2018 -2019
	16	Contribute actively toward the development of Risk-KAN	Working with WCRP, Future Earth and other partners to develop a Knowledge Action Network	Risk-KAN become operational.	ICSU, ED, IPO, SC members	Improved ST action networks for SFDRR	2018-2020
	17	Regional DRR Events in all regions	IRDR contributing through SC members, NCs and ICoEs to DRR regional meetings and events on DRR & SDGs	Participation and technical advice.	SC, NCs and ICoEs in liaison with ISC and UNISDR regional offices; IPO to report	IRDR Promotion and Visibility of the Program	2018-2020
Improve the visibility of IRDR	18	Co-organize Scientific Form on Landslides	Work with ICL to organize Tokyo WLF5 in Kyoto	Specific papers and publications on landslide related risks.	ICL, SC, IPO	Specific contribution of IRDR toward Sendai Partnership (on slides)	2020
	19	Communication and outreach	Implementation of IRDR communication strategy approved at 18 th session of SC meeting	Operation in major social media, web and wikipedia	IPO	Enhanced IRDR communication and public understanding	2018-2020
	20	Special IRDR Journal Issue	Specific topic, tentative	1 Publication	SC	IRDR Legacy	2018-2019
	21	An IRDR Handbook	A stock taking handbook of science on Integrated Research on DRR	1 Publication	SC and Working Group	IRDR Legacy	2018-2020
	22	Scientific/Policy Output 2020 per IRDR WG	Short publication for decision makers on policy and practice	1 short Publication Guidelines	Working Groups	IRDR legacy	2018-2020

4.4 Programme management

4.4.1 Overall management arrangements

The programme management of IRDR are ensured through the following arrangements:

- A Letter of Agreement between IRDR Co-sponsors and the host country China, and Memorandum of Understanding on the establishment of IRDR IPO in Beijing for IRDR, both signed in 2010 for period of 10 years⁵⁹.
- IRDR SC to guide the overall scientific programme implementation. The members of IRDR SC are nominated by ISC Board.
- IRDR IPO to executive IRDR workplan under the guidance of IRDR SC and its Chair. IPO reports its work to IRDR SC and to IRDR co-sponsors and the donor on regular basis.
- A coordination committee consisting of the co-sponsors, host of IPO, IRDR Chair and the Executive Director of IPO ensure the oversight function. This committee was established following IRDR mid-term review in 2016 and meets once a year. Thus far, the committee has met in Paris (2018) & Geneva (2019).

4.4.2 Financial management

Regarding the budget, the host of IRDR IPO, namely CAST, CAS, and AIR, provide funding as well as financial management for the regular

activities of IRDR-IPO. This includes staff cost of IPO, cost for organizing and facilitation of participation of one SC meeting each year, publication of IRDR reports and papers, maintenance of IRDR web-portal and social media, and organizing meetings and seminar per the requests of the programme. IPO also provide support to expert missions and some ICoE and Young Scientists to attend IRDR meetings. In parallel, ISC finances one session of IRDR SC meeting each year. Both ISC and UNDRR provide support IRDR experts to participate international meetings and forum when it is needed.

It has been noted that all IRDR NCs and IRDR ICoEs are self-funded. Some ICoEs have flagged the need to have seed fund from IRDR for their initiatives and activities. Through its partnerships, IRDR has also supported capacity building and training by grouping resources with its partners. It is clear however, that the current arrangement and financial management support is not efficient enough to meet the requirement of IRDR work. In its next phase, IRDR must establish a regular programme budget supported by the financial systems to enable the IPO to carry out studies and commission research work internationally, and in particular in IRDR nodes in developing countries. Without this the implementation of new phase of IRDR will be hampered, as already the case during 2010-2020.

Table 4-2. Staffs of IRDR IPO (2010-2020)

Executive Director	Science Officer	Communications Officer	Administrative Officer	Administrative Assistant
Jane Rovins	Kerry-Ann Morris	Luke Driskell	LANG Lang	ZHAO Cuili
Rudiger Klein	CHENG Yaoying	Anna Rudashko		WANG Jiqiang
William Paton	Anne Castleton	SHU Yang		
Rajib Shaw	LU Kuanju	Chin Cabrido		
HAN Qunli	LIAN Fang	JIN Xianlin		

⁵⁹ These two documents are provided in the appendix and they have been both extended to the end of 2021 in 2020 based on mutual agreement reached by the parties concerned.