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### CLIMATE CHANGE DATA ECOSYSTEMS FOR BETTER CLIMATE ACTION
### INTRODUCING AN ASSESSMENT FRAMEWORK

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*Abstract*

*The availability and use of coherent climate change data are crucial to help countries to mitigate the effects of climate change and help societies to adapt to new climate realities. Developing a data ecosystem for climate change data, a CCDE, can help countries to activate the power of data in an effective way to become more resilient. A coherent CCDE is a dynamic system where policy makers, government agencies, climate experts, the private sector and other actors can work across data silos and use data to report to and monitor their global commitments under the United Nations 2030 Agenda for Sustainable Development, United Nations Framework Convention on Climate Change and the Paris Agreement, as well as their national mitigation and adaptation plans.*

*Yet most national CCDEs suffer, however, from lack of resources and capacity constraints, data and data literacy gaps, weak co-ordination and data stewardship, and outdated regulatory frameworks. The assessment framework presented in this paper is a model for National Statistical Offices (NSOs), line ministries and other critical data actors for climate change to identify the demand for climate change data for both global commitments and national strategies as well as data gaps, map the key stakeholders and their roles in the CCDE, and identify the capacities to activate data for climate action.*

*Based on the evidence derived from the assessment, National Statistical Offices in collaboration with key line ministries will be able to identify actions to develop capacity in prioritised areas for national climate change data. The framework also proposes a set of recommendations for NSOs to leverage the climate change action plan to mainstream a CCDE approach into the National Statistical System, including actions to strengthen: 1) co-operation and co-ordination, 2) transparency, openness, and sharing, 3) fit for purpose data and 4) resources and capacity development.*

## I.    WHY ASSESS NATIONAL CLIMATE CHANGE DATA ECOSYSTEMS?

1.      In the age of big and open data, a "data ecosystem" is defined in the academic literature as "the people and technologies collecting, handling and using the data and the interactions between them" (Parsons et al., 2011) Data ecosystems are highly diverse and complex, as they involve multiple actors, acting as data producers, holders, and users, with different roles, skills and capacities, values, and types of engagement (Susha et al., 2017; van den Homberg & Susha, 2018). Data ecosystems can be further understood as organic information systems (Nardi & O'Day, 2000) involving interdependencies and

interrelations between components in a particular environment under constant evolution (van den Homberg & Susha, 2018).

2. In the context of climate change data, adopting an ecosystems approach offers great potential for improving the availability of data as a fundamental building block of climate action. The climate crisis is a global, highly dynamic, and multidimensional issue, which involves the exchange of immense amounts of information, across borders and actors, involving a great diversity of variables interconnected with all other areas of development, at local regional, national, and international levels. In the current situation, uncertainty about climate change and an increasing urgency for effective climate action are demanding unprecedented levels of information, collaboration, and innovation. Adopting a climate change data ecosystem approach offers a holistic framework to navigate across data silos, increasing data interoperability, harmonization, and coordination mechanisms. This will allow countries to better produce, use, and manage climate change data for informing and strengthening national climate change mitigation and adaptation actions.

3. While climate change data ecosystems (CCDEs) may exist by default, these are highly fragmented and lack institutionalized roles and structures. The PARIS21 scoping paper Envisioning a climate change data ecosystem - A path to co-ordinated climate action identifies five key challenges hampering the development of an effective and sustainable ecosystem of data related to climate change. These include prevailing data gaps, lack of effective coordination among actors and across sectors (i.e., agriculture, disaster-risk reduction, or urban planning), institutional and regulatory barriers to data sharing and interoperability, as well as resource and capacity constraints.

4. In order to advance towards an inclusive and coherent CCDE at national level that facilitates the availability of data on climate change to support decision-making, there is a need to develop an agile action plan to tackle identified challenges. For this undertaking, it is fundamental to increase knowledge of climate change data needs and availability, key actors, and capacity gaps at national level. Moreover, it is crucial to enhance engagement with stakeholders and coordination on climate change data at national level.

5. Consequently, focusing on the above-mentioned challenges, the assessment process outlined in this framework proposes a pathway to strengthening climate change data assets, institutions, and governance frameworks, while mobilizing key stakeholders. This will allow the use of official statistics, administrative data, and data from a wide range of non-governmental sources, and it will improve the ability of National Statistical Offices (NSOs), government and other actors to use climate change data for effective monitoring, reporting and decision-making processes to reduce the effects and risks of climate change on people's lives.

6. This country-based framework is composed of three main steps to evaluate the state of climate change data ecosystems at a national level. Step 1 corresponds to the identification of the current and potential climate change data ecosystem, mapping national climate change data needs, key actors, and gaps. Step 2, anchored in the evaluation of data gaps, involves identifying capacity gaps to mobilise climate change data actors and activate climate change data. Finally, step 3 culminates in a set of recommendations to facilitate the development of a country action plan for climate change data within the framework of the National Strategy for the Development of Statistics (NSDS) or relevant climate change plans. It further concludes with a set of actionable recommendations for the way forward, including the development of a long-term and comprehensive climate change data strategy that can help countries to become more resilient to a changing climate. Recommendations are grounded on the four

key principles identified by PARIS21 for effective CCDEs: co-operation and co-ordination; transparency, openness, and sharing; fit for purpose data; and resources and capacity.

7.     The scope of this country-level assessment framework goes beyond the National Statistical Systems (NSS), as it considers the interactions and linkages with and among other relevant stakeholders across the climate change data value chain. Moreover, this framework has been developed through a series of iterations to be a flexible and dynamic instrument, allowing to build national ownership and to adapt it over time, based on evolving country priorities and needs.

8.     The proposed assessment framework complements existing tools such as the Environment Statistics Self-Assessment Tool (ESSAT), the Climate Change Statistics / Indicators Self-Assessment Tool (CISAT)[1] , the UNFCCC Enhanced Transparency Framework, the United Nations Economic Commission for Europe (UNECE) Climate Change-related Statistics prioritization tool and example road maps, and assessments such as the Open Data Inventory framework (ODIN). Complementarity comes in different forms depending on the tool. For example, the CCDE Assessment Framework might complement results from the ESSAT or CISAT by defining actionable steps for the mobilisation of stakeholders and resources to close the data gaps identified through the ESSAT or CISAT.
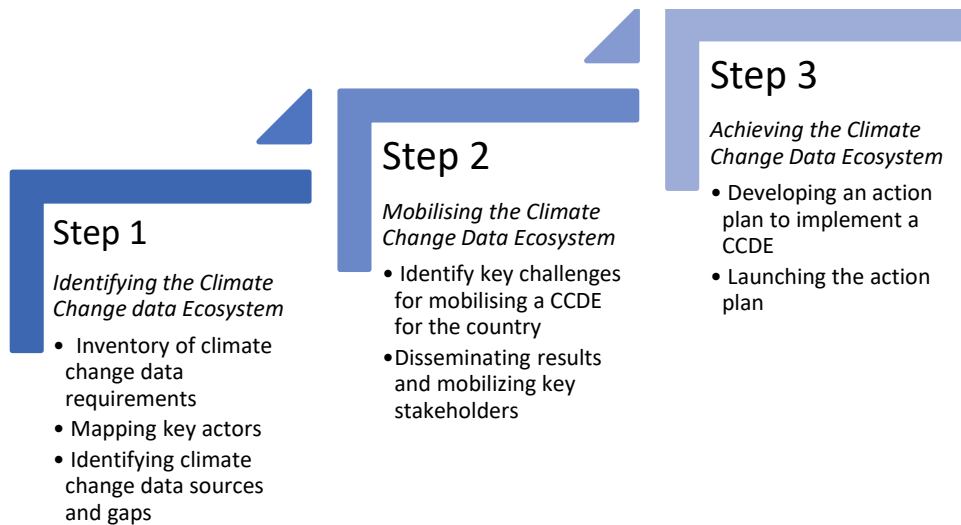
9.     The proposed framework focuses on capacity development efforts - enhancing collaboration between NSOs, national agencies in charge of climate reporting and policy making, and other key stakeholders - and on building an enabling institutional environment with regard to climate change statistics production, use and dissemination, as urged by the United National Statistical Commission 53rd Session Report of the Secretary-General on Climate Change Statistics (E/CN.3/2022/17).

## II.     A CCDE ASSESSMENT FRAMEWORK

10.     This section presents the proposed framework to assess the current state of a national CCDE, which consists of three steps, as summarized in Figure 1. The first step is identifying the existent CCDE through the mapping of national climate change data needs, key actors, and data gaps. The second step involves mobilizing the CCDE by assessing capacity challenges to activate climate change data for climate action. The last step aims to set the foundations to achieve a functioning CCDE through the formulation of an Action Plan for climate change data.

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[1] The CISAT is being finalised by UNSD and a first draft will be presented at the Ninth Meeting of the Expert Group on Environment Statistics (EGES) which will be held virtually on 25-28 October 2022.

**Figure 1**. Summary of the assessment process



Step 1

*Identifying the Climate Change data Ecosystem*

• Inventory of climate change data requirements
• Mapping key actors
• Identifying climate change data sources and gaps

Step 2

*Mobilising the Climate Change Data Ecosystem*

• Identify key challenges for mobilising a CCDE for the country
• Disseminating results and mobilizing key stakeholders

Step 3

*Achieving the Climate Change Data Ecosystem*

• Developing an action plan to implement a CCDE
• Launching the action plan

Source: PARIS21.

## 1.    STEP 1 - Identifying the climate change data ecosystem

11.     The overarching objective of step 1 is to facilitate the assessment of the current state of national climate change data ecosystems by mapping 3 key components: 1) national climate change data needs, 2) key actors, and 3) data sources and gaps.

12.     The expected result is to develop a concise assessment process that allows countries to identify their climate change data gaps in a coherent climate change data ecosystem.

13.     To achieve these outputs a mixed methodology is proposed to fill in a simple template at the different steps of the process, provided in Annex 1. The methods consist of the desk research to inventory national climate change data demands, a workshop with key stakeholders to map existing and potential actors and to help develop the list of relevant actors that includes possible data suppliers, and simple questionnaires to these actors for identifying data sources and bottlenecks further along the process.

### 1.1 Inventory of climate change data requirements

14.     **Step 1.1 in a nutshell**

The first component of step 1 consists in identifying what needs to be measured with regards to climate change data at a country level. Hence, countries should identify their existent demand for relevant climate change data and indicators, including information about drivers, impacts, vulnerabilities, mitigation, and adaptation. Climate-related indicators from national climate change plans and international climate change reporting commitments under the Paris Agreement and the Sustainable Development Goals (SGDs) are suggested as reference frameworks.

The expected result is to have a list of relevant data needs and priority areas at the end of the assessment.

The proposed methods to facilitate this process are desk research and bilateral engagement with climate change focal points of key ministries linked to environment and climate to fill in a template as the one provided in Annex 1 .

15.     To identify demand for climate-related data, it is fundamental to have a clear definition of what climate change data is. "Climate change data" is defined in the PARIS21 scoping paper *Envisioning a Climate Change Data Ecosystem, a path to co-ordinated climate action* (2022) as "the environmental, social and economic data from official government sources and non-governmental sources that measure the human causes of climate change, the impacts of climate change on human and natural systems, and the efforts of humans to mitigate its negative consequences and adapt accordingly". This is based on a definition by the UNECE and is meant to incorporate a broad approach to climate change data, encompassing its wide variety of types, uses, and socioeconomic and cultural aspects, which are not directly linked to scientific measurements of climate variables. However, this definition should be adapted to suit specific country contexts.

16.     National climate change data demands stem from two main sources: 1) international reporting commitments and 2) national needs and priorities linked to climate and environmental issues.  In terms of international reporting, countries often have legally binding responsibilities to provide information on progress and pledges made to address climate change through mitigation and adaptation actions. These commitments are defined in multilateral environmental agreements (MEAs), such as the Paris Agreement (2015) under the United Nations Framework Convention on Climate Change (UNFCCC) or the Sendai Framework for Disaster Risk Reduction 2015-2030, but also from other global and regional agendas that countries have committed to report on, including the 2030 Agenda for Sustainable Development. It is therefore a crucial step to evaluate what are the type of data and indicators required to deliver on such reporting requirements to monitor progress, track implementation and increase ambition.

17.     At the country-level, data demand derives from national needs and priorities with regards to climate change mitigation strategies and adaptation plans. National needs are highly context-specific and depend on each country's priorities, which are based on their exposure and vulnerability to climate change-related impacts, together with perceptions of such risks and urgency for action across different layers of society. Therefore, the inventory of national demand for climate data should be based on the overarching principles of national priorities and country ownership. Countries should evaluate what are the climate change data requirements in their National Development Plans (NDPs), national mitigation commitments embedded in the Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs), as well as in other existing or planned climate change-related policies, strategies, or plans, such as those from disaster risk reduction, biodiversity, or water use and management.

18.     Given the holistic nature of climate change, it is likely that national climate change data demands need to be tracked back across multiple sectoral plans and strategies beyond, if existing, climate-specific ones. An inventory of climate change data demand should be a cross-cutting exercise, involving cross-sectoral assessments and collaborations among different ministries and relevant stakeholders.

19.     Nevertheless, considering the complexity of climate changes data ecosystems, countries have often not identified a clear demand for climate change statistics and indicators. Even where demand has been established, there is often not a robust implementation of monitoring and evaluation (M&E) strategies that include measurable impact indicators to track progress.

20.     In this context, the proposed assessment framework developed by PARIS21 suggests researching and analysing what climate change data is for the country stemming from national climate plans, policies and strategies. It is also proposed to undertake bilateral engagement with climate change focal points of key ministries linked to environment and climate in order to obtain more granular information about the precise data needs currently existent. The result of this process should be an inventory of relevant climate change data needs according to the country's priority areas, to be input into a template (General Climate Data Template, such as the example provided in Annex 1).

21.     This could include:

- An inventory and analysis of the most widely used global observational data and analytics (e.g. sea level, temperature, predictive models) that may be relevant at a country level
- An inventory and analysis of common climate reporting requirements, including those required under the Paris Agreement and the UN Sustainable Development Goals
- An assessment of typically available climate risk assessment data and models for use at a national or subnational level
- An assessment of data types and models important to disaster risk management
- An assessment of data types and models important to overall climate adaptation and resilience

22.     Creating a "demand pool" of statistics and indicators in this domain has the potential to assist both countries that do and do not have in place national climate data strategies and indicators. For the first category, the list of needs will provide a comprehensive and standardized guide of what needs to be measured in terms of climate data. Countries will be able to assess whether they have demand for data in a particular climate-related area and/or measurable impact indicators for climate change in their national monitoring and evaluation frameworks, which will facilitate reporting and indicate priority areas for action. For countries without a clear demand for climate change data and specific and measurable climate change indicators available, this exercise can provide a good starting point to identify key target and priority areas at a national level, to further develop a national climate change data strategy, including monitoring frameworks.

23.     **Box 1. Using the UN Global Set for Climate Change Statistics and Indicators: a feasible framework to identify demand for climate change data at a country-level?**

The United Nations Global Set for Climate Change Statistics and Indicators has been recently developed by United Nations Statistics Division (UNSD) following a global consultation process, and was adopted at the fifty-third session of the United Nations Statistical Commission in March 2022. As an overarching framework of climate indicators, the Global Set reflects national priorities and sets minimum target indicators to track climate change on 5 key areas - drivers, impacts, vulnerabilities, mitigation, and adaptation. In total, it compiles 158 indicators and 190 statistics grouped in different topics under each area. It also includes the correspondence between each indicator/statistic and main international reporting commitments under the 2030 Agenda for Sustainable Development, the Paris Agreement, and the Sendai Framework. Hence, in the future it could become a comprehensive framework to guide country work when developing climate change statistics and indicators.

As a complementary tool, UNSD is also developing a Climate Change Statistics / Indicators Self-Assessment Tool (CISAT) to offer UN member states an opportunity to undertake a thorough and detailed assessment of the statistics and indicators in the Global Set. PARIS 21 conducted desk research to validate the feasibility of using the Global Set as a guiding framework of indicators to assess climate change data needs

and gaps for national climate action. The analysis focused on Small Island Developing States (SIDS) and Least Developed Countries (LDCs) from the Caribbean and Asia-Pacific regions. It evaluated the extent to which a sample of five countries (Saint Lucia, Grenada, Suriname, Fiji and Kiribati) had in place measurable climate change impact indicators to be monitored based on their NDPs, NAPs and NDCs. The analysis further assessed whether existent indicators were aligned with the Global Set. This exercise allowed to grasp a general idea of the current state of climate change data demand and priorities from a country perspective. It was acknowledged that findings can also be extrapolated specifically to climate-related SDGs, as these are already incorporated in the Global Set.

Overall, it was observed that there is high variability in the existence of M&E frameworks linked to adaptation and mitigation plans, and climate-related indicators in NDPs. Some countries do have M&E strategies in an advanced or developing stage with measurable climate indicators in place, and synergies are observed between key indicators from the Global Set and national climate strategies. However, countries' indicators tend to be more granular and reflect key priority areas at a national level. In terms of climate-related indicators included within key performance indicators from NDPs, these are mainstreamed across different development areas, including agriculture, fisheries, urban infrastructure, or energy. Indicators related to mitigation and adaptation are present, yet, these are limited, not as developed, and cover just key themes, as opposed to those available in climate-specific plans. There also appeared to be little demand for indicators linked to climate impacts and vulnerability assessments within NDPs, NAPs and NDCs.

Moreover, monitoring frameworks and indicators seem to be more standardized and existent for mitigation indicators linked to the NDCs, rather than for adaptation indicators from NAPs. It was further observed that some countries only state their intention to develop an M&E plan or mention its existence without any measurable climate indicators attached. In addition, a considerable number of countries are still in an initial stage of assessing their progress on climate actions and might not have yet embarked in assessment processes and operationalized their M&E strategy. These intuitions are validated with results from a recent study by Leiter (2021), concluding that more than 60% of countries that have adopted a NAP have not yet started the process of tracking its effective implementation.

## 1.2 Mapping key actors

24. **Step 1.2 in a nutshell**

Once the demand of climate-specific data has been determined, this information can be used to identify where these data could be available and validate the priority areas for data demand identified in the needs assessment. This process will allow to connect demand and supply, offering a wider picture existent climate change data system.

The expected results are 1) the establishment of an expert group with key stakeholders for the development and/or improvement of the national climate change data ecosystem, including representatives from the NSO and the Ministry of Environment; 2) the compilation of an inventory of key data holders, users, advocacy, and resource mobilization actors based on the national priorities for climate change data. This information can be used to fill in the specific sections of the  General Climate Data Template, such as the example provided in Annex 1.

The proposed method is a formalized stakeholder mapping process through a workshop with key stakeholders, in particular the NSO and the Ministry of Environment.

25.     The second step in the identification of the national CCDE is assessing the national environment for climate change data and where these could be available. It also involves identifying relevant stakeholders across the climate data value chain - from production and collection, to use, management, and dissemination. The following criteria for categorizing data actors are suggested to guide the stakeholder mapping process:

- **Data producers and data owners:** referring to the organizations and agencies responsible for generating, collecting and storing climate-relevant data. Data providers/owners can stem from a multitude of sectors and include NSOs, line ministries, meteorological offices, civil society, academia and research institutes, private sector, infomediaries and intermediaries, civil society through citizen/generated data (CGD) etc.;
- **Data users:** denoting data consumers which have the potential to or use, process and analyze in practice climate change data. These be at a global, national or local level and comprise policy makers and governments, academia, think tanks and research institutes, private sector, civil society, non-governmental organizations (NGOs), media, infomediaries and intermediaries, etc.;
- **Advocacy actors:** encompassing groups and organizations involved in the processes of sharing, disseminating and communicating climate change statistics for raising awareness. These may include civil society, NGOs, media, infomediaries and intermediaries etc.;
- **Resource mobilization actors:** representing organizations and entities providing funding and technical assistance for capacity development linked to climate change data and statistics production, use and dissemination, including development partners, international organizations, government agencies, data funders and donors, etc.

26.     These suggested stakeholder groups are a synthesis on major categories to map actors commonly used by academic literature on data ecosystems for sustainable development and existing reports from development agencies (UNDP, 2017; van den Homberg & Susha, 2018). It is also worth mentioning that one actor can hold multiple roles and be categorized under different groups. For instance, line ministries may be the owners of climate change data and also play a role in the process of analysing and using it. In the same way, the media can act as both advocacy actors and data users by processing raw information to produce visual storytelling products to better communicate climate change information and influence citizen behaviour (PARIS21, 2022b).

27.     Bearing in mind the ecosystems approach, the focus is placed on connectivity and interactions, with the intention to better understand the type of existing relations (ad-hoc or regular) and value exchanges (data, financing, formal statistics, etc.) between actors. The outcome of this part of the assessment process is to produce a usable list of actors following the identified country priority areas for climate change data. This information will allow to better evaluate NSS data and capacity gaps in the next step. An example template to facilitate this part of the assessment, a General Climate Data Template, is provided in Annex 1.

28.     It is suggested that the mapping process is carried out during an expert group workshop that involves key stakeholders of the national climate change data ecosystem, such as the NSO and the Ministry of Environment focal points for climate change, or any other relevant government agencies responsible for the implementation of climate change mitigation and adaptation plans. In this workshop, the expert group will also validate the climate change priority areas identified in step 1.1. and identify key actors involved in the climate change data value chain. Following an "upstream-downstream" approach from producers to end users is suggested.

29.     The identification of climate change data producers and/or holders at a country level should involve defining actors at two levels. On a first level, traditional data producers should be considered, such as line ministries, agencies, and departments in charge of producing the requested data and/or indicators.  On a second level, other producers and/or holders including non-governmental actors such as NGOs, private sector, and civil society should be also incorporated.

*1.3 Identifying climate change data sources and gaps*

30.     **Step 1.3 in a nutshell**

After the assessment of climate data needs and key actors, identifying what are the possible climate change data sources and the most pressing climate-related data gaps is the third component in the process to evaluate the current state of national climate change data ecosystems.

The expected result is a report of major climate change data gaps, which is based on the priority areas identified in step 1.1 and validated in the expert group workshop from step 1.2.

The proposed method is to gather information from simple questionnaires, such as the examples provided in Annex 2 from key stakeholders identified by the expert group in step 1.2, from previous environmental and climate change data statistics reports (i.e., ESSAT or CISAT Tools) in case countries have already conducted such assessments, and from desk research. The proposed sections specific for this part of the assessment are provided in Annex 1. Then, a final assessment evaluating the key data gaps will be produced.[2]

31.     The third step in the process of identifying the CCDE consists of matching the existing demand and supply for climate change data derived from steps 1.1 and 1.2, and analysing the possibilities for and obstacles to engaging with the data actors and using the data.

32.     The demand for climate change data should be identified for the specific country context, considering both national needs and global commitments in line with the General Climate Data Template, based on priority areas from NDPs, NDCs and NAPs identified in step 1.1. Following this, possible data actors and data sources should be identified for each of the climate change data needs and/or indicators selected, to match with data supply to meet the international and national climate data demands. It is proposed that the data owners mapped in 1.2. can be identified per climate change data requirement and/or indicator on two levels since method of engagement and challenges may differ:

- Within the NSS, including line ministries, government organizations and agencies;
- Among the broader data ecosystem level, including academia and research institutions, civil society and private sector actors.

33.     Finally, after identifying the demand, possible data sources and data owners for a particular climate change data requirement or indicator, the characteristics of the data should be evaluated in two dimensions:

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[2] If the country´s capacity and demand for indicators allow, PARIS21 data planning tool (ADAPT) can also be used to conduct the data gap assessment. ADAPT allows to report on and review several aspects concerning climate-specific indicators, including its availability, applicability, dependency and feasibility.  See more details in Annex 1.

- The state of **data openness**, which includes information on whether the data is already being used, being used but with limitations or not being used yet but could potentially be used;
- The **data quality** status, which includes data availability, periodicity, disaggregation level and type of data source.

34.     In terms of data openness, an initial assessment should be carried out to document data availability, openness, and access policies in the selected country to show their current state and possible improvements necessary. The assessment can be guided by the Open Data Inventory (ODIN)[3] methodology which captures the adherence to open data standards.

35.     Further to this template, it is suggested to use simple questionnaires sent to data actors identified in step 1.2, to obtain information from previous environmental and climate change data statistics reports (i.e., Environment Statistics Self-Assessment Tool (ESSAT) or the Climate Change Statistics / Indicators Self-Assessment Tool (CISAT)) and to undertake desk research. The use of a template is also suggested and an example is provided in Annex 1 to facilitate this assessment and compile information in a dynamic inventory for the realization of a report on the current national climate change data gaps by the NSO focal point for climate change.

36.     The result of this step will be a comprehensive overview of the country´s climate change data gaps and existing data with potential use for closing these gaps, but that require actions to make this data available for use.

37.     **Box 2. Complementarity with Existing Assessment Tools & Frameworks Relevant for a CCDE**

Multiple frameworks and tools are emerging to assist countries to better develop and strengthen their climate change data systems.

To help NSOs improve climate change data and statistics development and support countries in the implementation of the Conference of European Statisticians' (CES) *Recommendations on Climate Change-related-Statistics*, the UNECE Steering Group on Climate Change-related Statistics a simple prioritization tool (developed in 2015 and updated in 2017). This was further complemented by the Example Road Maps to Improve Climate Change-related Statistics, also developed by UNECE in 2017, which show how the tool can be used in countries with different capacities to measure climate change. These guidelines aim to help countries help to identify to identify priority actions to improve climate data, data gaps, and stakeholders, evaluate progress in implementing the CES recommendations and further develop priorities related to data for greenhouse gas emission inventories, other climate change-related statistics and indicators, statistical infrastructure and capacity.

NSOs aiming to assess their current climate data gaps in the NSS can also benefit from the Environment Statistics Self-Assessment Tool (ESSAT) for assessing the state of environment statistics. This tool has been developed by UNSD, in collaboration with the Expert Group on Environment Statistics in 2021. It is based on the Basic Set of Environment Statistics in support of the Framework for the Development of Environment Statistics (FDES 2013). The ESSAT aims to measure the national policy relevance, importance, availability, and sources of environment statistics contained in the Basic Set. The existence of previous

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[3] The Open Data Inventory (ODIN), developed by Open Data Watch (ODW), measures how complete a country's statistical offerings are and whether their data meet international standards of openness. https://odin.opendatawatch.com/#:~:text=The%20Open%20Data%20Inventory%20(ODIN,2020%2F21%20covers%20187%20countries.

ESSAT assessments can reduce the burden on NSOs in evaluating the state of CCDEs. ESSAT can facilitate the process of mapping key actors to climate change data and introducing data in the proposed template to report specific climate change data gaps, given that information on climate statistics will be already available from the environment statistics assessments.

More recently, UNSD embarked in the development of the Climate Change Statistics / Indicators Self-Assessment Tool (CISAT). A new tool with a focus on climate change statistics and indicators to assist UN Member states to assess the relevance, methodological soundness and characteristics of the statistics and indicators listed in the Global Set. The CISAT offers a great opportunity to help countries at a technical level in the production and collection of climate change indicators and statistics for reporting the various global agendas and agreements countries have committed. Due to its strong technical basis and comprehensive list of climate change indicators, the tool can be an important framework for the implementation of CCDEs, in helping governments to define what climate change indicators could and/or should be to enable national climate action.

While the UNSD and UNECE's tools guide countries on the identification of what are the gaps, the PARIS21's assessment framework offers complementarity to guide national stakeholders on how to close data and capacity gaps for a more effective use of climate change data. The CCDE assessment framework offers great potential to assist countries in being able to begin dialogue with different actors from the NSS and the broader data ecosystem and explore the use of both official and alternative data sources. It also proposes an actionable way forward to enhance CCDEs by identifying the national capacity needs and priorities from a bottom-up approach, mobilizing resources, and improving collaboration between NSOs, national authorities responsible for reporting climate change related information and other strategic government and non-government actors.

## 2. STEP 2 - Mobilising the CCDE: Assessing national capacity challenges and priorities

38.     This step focuses on identifying and validating the granular and concrete statistical capacity needed to activate climate change data for effective decision-making. The step is designed in two phases, one to identify key challenges based on the questionnaire conducted in Step 1 and the other to validate and further complement these findings with national stakeholders.

39.     The expected deliverable of this step is having a capacity assessment outlining concrete prioritised statistical capacity areas that need to be strengthened in the country to unlock the use of climate change data for action.

### 2.1 Identify key challenges for mobilising a CCDE for the country

40.     **Step 2.1. in a nutshell**

This component in the process of mobilising the national CCDE focuses mainly on identifying the main statistical capacity development aspects limiting the use of existing climate change data to improve reporting and decision making.

The expected result is having a list of data classified into three categories: potentially use, use with limitations, and missing data, followed by SWOT analysis and a granular statistical capacity development mapping.

The proposed method uses the questionnaire from Step 1 to conduct the analysis, which can be further developed and strengthened through the intermediate workshop suggested in the next component of the process.

41.    This phase of the assessment process aims to identify the main challenges preventing 1) produced climate change data (either by government or non-government actors) being used for climate action, and 2) the required data to be produced.

42.    Building on information gathered already from Step 1 through the General Climate Data template and the assessment of Open Climate Data, this step focuses on the missing or potential data considering the following possible options:

- **Existing data with potential use** – data produced by either government agencies or actors outside of the government such as the private sector, civil society, or academia with the potential to be used for climate action by a broader set of users, but data are not available.
- **Existing data being used with limitations** – these are data being used for reporting or decision-making, but with some aspects limiting its full potential for more effective actions. Some examples might be the need for more disaggregated and updated data, a slow data sharing process or incompatibility with other data sets due to different formats used for data collection.
- **Missing data** – data demanded for developing, implementing and monitoring national adaptation plans and mitigation strategies and reporting to climate change commitments but is not being produced yet.

43.    Once existing and missing data have been mapped according to the above classification, the next activity is to conduct a capacity gap analysis. Based on the identified strengths and opportunities derived from the analysis, countries can start prioritising which data sets are more strategic for meeting the national demands. And using information from the weaknesses/challenges and threats analysis, countries will start identifying what can be done to unlock the use of existing data.

44.    The PARIS21´s Capacity Development 4.0 framework is proposed to complement the capacity analyses by guiding the identification of concrete and more granular challenges and needs in terms of capacity. The framework (summarised in Figure 2) offers a comprehensive matrix to identify capacity development needs at three levels: individual, organisational and system. And across five target areas: resources, skills and knowledge, management, politics and power, and incentives.

**Figure 2.** Capacity Development 4.0 Framework Matrix



Source: (PARIS21, Proposing a Framework for Statistical Capacity Development 4.0, 2018a)

45.     A detailed description of the matrix levels and areas is provided in Annex 3. The purpose of using the framework is for national stakeholders to identify concrete statistical capabilities needed for producing and effectively using prioritised climate change data. Often capacity assessments end at the level of the targets presented in the matrix, for example, by highlighting the need for more resources and skills but without further granular details on the type of resources and skills. Having more granular information on the type of capabilities that need to be developed and strengthened and whether this should be at the individual, organisational or system level is crucial for outlining the actions that will make it happen.

46.     Unlocking the use of climate change data at the national level might require strengthening diverse capabilities depending on each country´s needs and priorities. Figure 3 presents examples of relevant capabilities for climate change data per each capacity development area and level proposed by the CD4.0 matrix. These examples show how national stakeholders can use the CD4.0 matrix to identify specific capacity gaps and improvement areas to input into their climate change data action plan.

**Figure 1**. Examples of specific capabilities for better and more climate change data for action

| Capacity area/Level | Individual | Organisational | System |
|---|---|---|---|
| Resources | • Staff with qualifications in statistics and a field relevant to climate change, such as agriculture, biodiversity, energy, water, disaster management, etc. | • Number of employees and budget dedicated to the production, management, and dissemination of climate change data<br>• Software for data management collected from water level radar sensors and solar panels | • Monitoring frameworks of climate change strategies (adaptation/mitigation)<br>• Manuals or codes for production and sharing of climate change data, including those from alternative data sources |
| Skills & Knowledge | • Technical skills on remote sensing data collection, image analysis and GIS systems proficiency | • Use of international standards and guidelines for climate change statistics (e.g., FDES, Global Set of CC) | • Knowledge sharing space for stakeholders involved in the use and production of climate change data (e.g., webinars, seminars, expert meetings, etc.) |
| Management | • Time of climate change data personnel dedicated to other areas | • Climate change data strategy is in place and aligned to other strategic national plans/strategies | • Committee/Task force with a focus on climate change data<br>• Data sharing agreements for climate change data |
| Politics and power | • Attendance to climate change statistics-related professional meetings, workshops/training events | • Data sets relevant to climate change and their metadata are available to the public | • Regular meetings and events where users and producers of climate change data have opportunities for exchange |
| Incentives | • Career opportunities within the climate change data ecosystem | • Approach to adapt to users' needs and demands for data on adaptation and mitigation | • National climate change issues are present in the political debate and agenda |

Source: PARIS21 based on the Capacity Development 4.0 matrix.

## *2.2 Disseminating results and mobilizing key stakeholders*

47. **Step 2.2. in a nutshell**

The last component in the process of mobilising the national CCDE involves the dissemination of results from step 1 and 2, as well as the sensitisation of stakeholders by increasing understanding of the landscape of actors and data gaps in the current CCDE and discussing capacity challenges identified.

The expected results are a validated list of priority capacity development areas from step 2.1 to guide the action plan and a final country assessment report synthesizing results from steps 1 and 2.

The proposed method will be the development of an intermediate workshop to present the results from assessment of the landscape of the existing CCDE from step 1, complement the results and validate the capacity development areas and SWOT analysis results from step 2.1. with relevant stakeholders.

48. After the assessment of climate change data requirements, gaps and key actors in step 1, together with the identification of key challenges for mobilising the national CCDE based on country climate change data gaps, the final step of this component is to mobilise and sensitize a wider audience in the CCDE. The overall aims are to increase understanding of current state of the CCDE assessed in step 1, validate the

capacity development areas identified in step 2.1 as a priority for the country and raise awareness of potential ways of contributing among key actors.

49.     This will be done though the organization of a sensitization workshop to disseminate the results from climate change data landscape assessment, with stakeholders from within the NSS but also from other ministries and government agencies working on climate change, private sector, civil society, academia, or research institutions, identified as (possible) data sources and with potential capacity challenges. This intermediate outreach will also be an opportunity to discuss possibilities and challenges in mobilising the data. Finally, a country assessment report should be produced synthesizing results from step 1 and 2. This should set the foundation to develop the climate change data action plan in step 3.

## 3.     STEP 3: Achieving the Climate Change Data Ecosystem: An Action Plan

### *3.1 Developing an action plan to implement a CCDE*

50.     **Step 3.1. in a nutshell**

This component aims to define an action plan to address the challenges and needs identified and prioritised in Step 2. The action plan involves specifying objectives, the concrete activities that would lead to achieving them and its costing. It is recommended to take a participatory approach to this process by involving technical actors of all relevant national agencies for climate change.

The expected output of this step is the action plan for climate change data that integrates the results from Steps 1 and 2 and proposes concrete actions to activate data for decision-making to build resilient societies.

The proposed method is conducting the design process of the action plan through a technical national workshop involving key stakeholders from the statistical office, the Ministry of Environment and other line ministries and national agencies. After the workshop the draft action plan can be refined through virtual bilateral consultations with national focal points.

51.     This component aims to identify smart objectives and concrete activities and the cost to make climate change data available and usable for effective actions by policymakers and a broad group of users. This step builds on results from the assessment report (step 2.1) that captures the list of data with potential use, its advantages, and the specific capacities to be developed and strengthened

52.     The expected output of this step is having an action plan for climate change data that can be anchored to a national planning mechanism (e.g., the NSDS, a climate change adaptation/mitigation plan/strategy or the national development plan).

53.     The following lists the recommended sections for the action plan:

- **Objectives** will be defined based on the capacity gap analysis, specifying capacity needs identified in step 2.2 and proposing possible solutions to the identified challenges and needs. As part of determining and validating the objectives with the focal points of the statistical office and the Ministry of Environment or the national agency in charge of climate change, a national planning agenda to anchor the action plan should be identified. This might be the NSDS, a mitigation/adaptation plan/strategy, the national development plan, or any other relevant planning agenda for climate change.

Linking the action plan for climate change data to an existing planning agenda relevant to climate change will help to mobilise the resources for implementing the action plan. Further, it might help strengthen the monitoring and evaluation process of the agenda anchored to the action plan. Some entry points for linking the objectives of the action plan to a national planning agenda might be through the mission and vision and the goals of the planning agenda.

- **Activities** – once objectives are determined, specific activities and the national stakeholders and agencies in charge of their implementation should be identified. This part of the process should answer the questions of what will be done, by whom and when.
  For the identification and definition of activities, it is recommended that activities already being implemented or planned to be by national agencies as part of their sectoral plans are considered here. The alignment of the action plan at the activity level with other sectoral plans can facilitate the engagement of critical national agencies and actors to implement the action plan for climate change data.
- **Costing** – all listed activities must include estimates of the cost needed to implement them, including the cost for personnel services, operational expenses, infrastructure, technology outlay, etc. Costing information will provide a proposed budget for implementing the action plan for climate change data. Clear costing information of the action plan activities facilitates identifying potential funding with development partners, ministries, and national agencies.

### *3.2. Launching the action plan*

54.    Organization of a final outreach virtual or face-to-face event, depending on the country´s needs, priorities and available resources, to officially launch and present the action plan for climate change data to a broader audience, including stakeholders from the national statistical system, ministries and government agencies, private sector, civil society, academia and research institutions, as well as key development partners, advocacy and resource mobilization actors identified in step 1.2.

## III.    HOW TO MOBILISE THE CLIMATE CHANGE DATA ECOSYSTEM: RECOMMENDATIONS FOR NSOS AND BEYOND FOR MOVING FORWARD

55.    The assessment process will be formally completed by a set of recommendations for NSOs, Ministries of Environment and other actors to mainstream a CCDE approach into the NSS anchored in the 4 key principles for effective CCDEs developed by PARIS21 and outlined in the scoping paper (PARIS21 2022).

**Co-operation and co-ordination**
1 – Integrate the climate change data action plan into relevant national strategies such as the national climate change mitigation strategies or adaptation plans, or the NSDS through the development of a climate change data strategy.
2 – Establish a coordination mechanism for climate change data (technical group/task force) or add the climate change data area to an existing mechanism, which involves the participation of relevant traditional and non-traditional stakeholders identified.

**Transparency, openness, and sharing**
3 – Create an enabling institutional framework, legal environment, and mandates to facilitate data sharing agreements and processes between actors in the CCDE.

4 – Identify opportunities to make more government data open for public use. (Awareness raising on the potential impact produced climate change data has beyond the Ministry/unit that produces it).

**Fit for purpose data**
5 – Explore the use of alternative data sources such as citizen-generated data, satellite data, big data, private sector data etc. to boost climate change data granularity, timeliness and relevance for effective reporting and decision-making.
6 – Produce measurable impact indicators for priority areas identified using the inventory of data sources and data produced.

**Resources and capacity development**
7 – Use the climate change data action plan to advocate for more and better climate change data and it use within the national stakeholders and development partners.
8 - Align/Link the climate change data action plan to ongoing climate change data projects in the country to facilitate access to funding.

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