Managing resource constraints when compiling GHG inventories and tracking mitigation actions in states and regions

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About the Climate Footprint Project

The Climate Footprint Project supports state and regional governments to improve their greenhouse gas emissions tracking and reduction efforts. In the first phase of the project, the project worked with states and regions in developing and newly industrialising countries including Pernambuco (Brazil), Chhattisgarh and West Bengal (India), Baja California, Jalisco and Yucatán (Mexico), and KwaZulu-Natal (South Africa).

Overview

States and regions often have limited resources, meaning individual staff members have to deal with a number of different topics and tasks, leaving limited time for each one. This constitutes a problem for more demanding technical tasks like the compilation of greenhouse gas (GHG) inventories, which requires expert knowledge and extensive data, as well as time and attention.

If you are unacquainted with the resources needed for the tracking of GHG emissions and mitigation actions, please first see our reference piece on required resources for emissions and actions tracking. More guidance on GHG inventory compilation and mitigation tracking can be found in this toolbox which supports state and regional governments with improving their GHG emissions tracking and reduction efforts.

> ***Disclaimer*** *– Please note that these constraints are not applicable to all of the seven states and are highly generalised, as to be applicable to other states and regions across the world. As a further consideration, the Covid-19 pandemic in the second year of the project restricted engagement with some project states and created extraordinary situations for most, thus the insights presented are also influenced by this situation.*

Common resource constraints for states and regions

States and regions across the world, including some that participated in the Climate Footprint Project, regularly manage resource challenges while compiling their GHG inventories. Examples of common constraints are provided below.

1. Limited staff and time – Institutions often have a very limited number of staff in the environmental or climate change areas, with each staff member responsible for a number of roles or several areas related to environmental issues or climate change. Typical examples include working on waste, air pollution and climate change at the same time, or working on adaptation and mitigation issues at the same time.

2. Limited training and expertise – Mostly, staff members have a general understanding of technical issues in the areas they cover, but often lack the time and resources to acquire detailed expertise and to dedicate themselves fully to one issue. Preparing GHG inventories and / or tracking the progress of mitigation actions are mostly new activities for these teams. Some of the states had developed GHG inventories previously on an irregular basis, generally using external consultants. Some of the staff members involved had at least a general understanding of what a GHG inventory was and what basic approaches were used for GHG estimation in the various sectors. In a few cases, staff had been participating in trainings on GHG inventories, acquiring theoretical knowledge, but lacking the time to participate in GHG inventory compilation themselves. This was of course a helpful starting point. More generally, however, adding GHG inventory compilation and tracking of mitigation actions to their already full agendas, proved difficult for the staff.

3. Limited systems and technology – Additionally, two of the states in the project had information technology (IT) systems in place for the tracking of mitigation actions, which were developed by external service providers. These systems allowed GHG impacts estimation upon entering simple data related to the implementation of specific mitigation actions. They did not cover all relevant mitigation actions and used strongly simplified assumptions and estimations for the assessment of mitigation impacts. The staff did not fully understand how the impacts were calculated and were not able to update the software by themselves. These systems were therefore not extensively used for the evaluation of the progress with mitigation actions, or for mitigation planning for the future.

Approaches to developing an inventory with limited resources

Generally, there are several solutions for dealing with a resource constrained situation. These can relate to increasing the available resources with limited cost or to use these resources more efficiently. Solutions can also relate to limiting the scope of the GHG inventory compilation and the mitigation tracking to what is most relevant for the state or region. Table 1 provides an overview of potential solutions to dealing with resource constraints. Solutions address both the input side, e.g. increasing the resources available and using them more efficiently, and the output side, e.g. focussing on the outputs most relevant for the state or region.

Table 1 Input and output-related solutions to working with resource constraints

Input-related solutions	Output-related solutions
a) Expand resources	**a) Limit scope**
Obtain buy-in from management to provide support and further resources	Focus on what is most relevant to the state or region, e.g. with regards to sectors, subsectors, timeframes, or level of detail
Increase team (with government funding or project-funding)	**b) Planning**
Use external resources (contract consultants)	Plan for long-term improvement
b) Improve processes	
Assign clear roles within the team (e.g. management, specific sectors, etc.)	
Use existing structures, processes and data to the extent feasible	
Document and archive everything to increase efficiency over time	
Establish processes (e.g. regular reporting), templates, cooperation agreements (e.g. with other entities) to support GHG inventory compilation and/or mitigation planning in the long-term	
c) Foster collaborations	
Involve other government entities, sectoral institutions, academia, and/or civil society institutions (e.g. for data collection, compilation of specific sectors of the GHG inventory)	
Join forces/ align with the national level (e.g. to obtain relevant data)	

Approaches per solution type

Expand resources

On the input side, obtaining buy-in from management is a key prerequisite. This might lead to obtaining further staff resources and/or funding, but just as importantly, it may allow for prioritising activities so that more time can be found for GHG inventory compilation and mitigation planning. To gain buy-in, it may help to present the benefits of an inventory for your state, e.g. fulfilling legal obligations, understanding regional emissions in order to set mitigation actions, using the process as an opportunity for stakeholder engagement, motivating action from partners, transparency and communication, etc.

The easiest – but often not feasible – solution is of course increasing the size of the team, ideally by adding a staff member with relevant expertise. Funding could come from long-term budgets, but also through project-funding.

Where funding is available, external consultants might play a role, e.g. in the compilation of the GHG inventory, the identification of indicators for mitigation tracking, or in other activities. In contracting external consultants, it is vital to document the work done comprehensively and in detail, so that when such work is repeated, it can be done in a comparable manner. Examples of items to document include the data sources used for the compilation of the GHG inventory, or assumptions used for indicators on the level of GHG mitigation achieved. Ideally, the documentation task is included in the terms of reference. The previously mentioned GHG inventory toolbox prepared under the Climate Footprint Project contains templates allowing for the documentation of methodologies, assumptions, data sources, data and more.

Foster collaborations

Where expanding resources is not possible, a different solution could be to involve other government entities and/or public/private institutions which work in a related area and have an interest in participating in GHG inventory compilation or mitigation tracking. Research centres, academia, industry organisations, non-profits/NGOs, and others all present possible partners for collaboration.

For instance, an agricultural research centre might be interested in being involved in the estimation of GHG emissions related to agricultural activities like cattle farming and soil use, as this complements their existing activities. Where a GHG inventory is regularly compiled at the national level – which will become increasingly common in the future, due to the regular reporting requirements which apply to all Parties to the Paris Agreement – cooperation with the institutions responsible for GHG inventory compilation at the national level will also be beneficial. Not only might certain data already be available disaggregated at the state or regional level, states and regions might also benefit from the existing expertise at the national level, can align with national level methodologies, and could benefit from new federal studies and insights. Such a cooperation can also be beneficial for the national level, as state and

regional level information might become available more easily, therefore reducing the data collection effort for them.

Improve processes

In order to use existing resources most efficiently, it is vital to assign clear roles within the team. The above-mentioned toolbox for GHG inventory compilation and mitigation tracking, as well as the US EPA's GHG Inventory Workbook provide more information on this. Also, to the extent feasible, it is best to build on existing institutional structures, roles, capacities and processes, be it in data collection, GHG calculation, reporting or quality control. A good way to start is to conduct a stocktaking exercise to understand which data is already collected and by whom, who might hold relevant sectoral experience, what institutional frameworks are already in place to facilitate the compilation process, etc. Again, findings should be documented in detail.

Efficiency in compiling GHG inventories and tracking mitigation actions is further increased by establishing sustainable processes. Such processes represent a clear and long-term agreement on who does which task when and how. This might include internal processes like GHG inventory planning, but also external ones, e.g. on data collection. Data sharing agreements (e.g. Memoranda of Understanding (MoU)), help ensure that the right data is regularly reported at the right time and in the right format without any concerns over confidentiality issues. Templates for data collection, but also calculation and documentation, can further help with implementing processes in a standardised manner. This will also support the efficiency of GHG inventory compilation in the future, as data sources, methodologies, and assumptions which have been documented can be readily used again. The GHG inventory compilation toolbox provides templates for a number of processes, including GHG inventory planning, QA/QC, documentation, etc.

Limit scope

On the output side, a key lever for dealing with constrained resources is limiting the scope of work. With regards to GHG inventories, this might mean focussing on the sectors most relevant to the state or region (e.g. energy and agriculture). It might also mean using simpler methodologies for sectors of lower priority, i.e. those which contribute less to total emissions. GHG inventories are ideally compiled for a certain timeframe to enable understanding of GHG emission trends, but compiling the inventory for fewer years will also help reduce the effort required. Of course, the closer to the present day the years assessed are, the more valuable the information is. With regards to mitigation tracking, prioritising can mean focussing on mitigation actions with the largest emissions-reduction potential or, again, on actions in specific priority sectors.

Planning

Overall efficiency is also improved by planning for long-term improvement. So, if not all sectors are covered, when should the remaining ones be included? Where simpler methodologies were used for

GHG emission estimation, when should they be upgraded to more sophisticated methodologies? Such long-term planning allows for setting relevant resources aside, for staff to conduct research and/or for time to receive relevant training.

A typical occurrence in resource-constrained situations is a focus on the present, aiming to get done the tasks at hand and leaving no capacity to plan for the future. However, a long-term outlook is generally important, to deal with or even alleviate the resource-constrained situation over time. This future-oriented planning can include formalising cooperation agreements (e.g. setting up MoUs with other institutions for cooperation in compiling the GHG inventory or for regular data provision), as well as establishing processes, roles, and tools to use (e.g. data collection templates, a simple database where data and other information used for prior GHG inventory compilations can be archived).

State and regional solutions from the project

Within the Climate Footprint Project, a number of solutions were found to deal with resource constraints. Examples of solutions found included:

Obtaining buy-in from higher management levels

- → After the project had begun, the initial environmental secretariat of Baja California, which was the state focal point for the project, was restructured to become part of a larger Secretariat including themes such as sustainable development, fisheries and tourism. The high-level management of this new institution was informed about the project and its aims in a webinar and thus were able to recognise the relevance of these activities. Within the project, this led to the newly combined Secretariat taking a much stronger leading role for Baja California, resulting in considerably increased attendance of project activities by other relevant Secretariats from all sectors.
- → At the beginning of 2019, the Pernambuco environmental secretariat also underwent an organisational restructuring, in which it created a specific department to deal exclusively with climate change. It was decided at this time that the preparation of the state inventory and the re-activation of the Pernambuco Climate Change Forum would become top priorities for Pernambuco, in order to accelerate climate action. The project helped catalyse these processes, especially through the use of in-country capacity-building workshops, that brought together influential stakeholders from across the state. As a result of this stakeholder engagement work, the Climate Change Forum also expanded to include more participants, increasing the breadth of its reach across the state. This strong buy-in from management, supported by the relevant technical capacity (see *"Contracting new team members with highly specific knowledge"),* allowed Pernambuco to compile a GHG inventory within six months, an extraordinarily short timeframe.

Using external consultants to fully or partially compile a regional GHG inventory

- → Jalisco contracted external consultants to compile their GHG inventories, choosing to focus their staff time on the role of coordination and quality control of the process. This allowed Jalisco staff, who had just received project training, to gain first-hand experience with cross-cutting elements of inventory compilation.
- → In Yucatán, the administration focused on performing the overall coordination of the GHG inventory compilation, as well as compiling the inventory for the energy sector, land use in the AFOLU sector and for the black carbon compound, while contracting consultants for the compilation of the remaining sectors (industrial processes and product use, livestock in AFOLU and waste). Again, this allowed the state to bring in external resources, while also enabling staff from the administration to gain experience with the coordination of the process and with compiling three specific sectors/subsectors.

Contracting new team members with highly specific knowledge

- → For the project, Pernambuco added a team member with experience in municipal GHG inventories. The new team member not only brought a technical understanding of how to compile a GHG inventory, but also contacts of relevant data sources. This improved the inventory compilation process considerably.
- → KwaZulu-Natal worked closely with colleagues from the municipal level that have been involved in GHG inventories compilation for a number of years, who were helpful in providing quality checks of the work done in each step of the process.

Teaming up with other institutions to increase the resource base

- → Baja California collaborated with a state-level energy NGO (which was involved in developing the state´s Climate Plan) in the compilation of the energy sector for the inventory.
- → The involvement of the Chhattisgarh Renewable Energy Development Agency (CREDA) and Chhattisgarh Council of Science and Technology helped to identify key data to be used to for the energy sector compilation. CREDA is also supporting implementation of a national energy efficiency programme by sharing relevant state level power consumption data. Teaming up with them allowed for these programmes to be efficiently taken into account when it came to assessing mitigation actions.
- → Jalisco set up a mitigation working group containing staff from all relevant secretaries and so was able to draw upon the specific sectoral knowledge of all secretaries in developing and enhancing mitigation actions relevant for their sectors.
- → Pernambuco reactivated its Climate Change Forum, which formally brings together different Secretariats alongside other institutions. The Forum included the creation of working groups with key experts to support the inventory compilation and estimations activities. The working groups continue to engage in discussions to develop sectoral climate action plans.

- → In KwaZulu-Natal, the cross-cutting secretariat on development, tourism and environment is responsible for the compilation of the provincial inventory. As the inventory team worked across different initiatives, whose delivery was negatively affected by the COVID-19 pandemic, they tried to build external relationships with key stakeholders in the national and municipal governments, in order to receive technical support and encourage data sharing. In particular, the secretariat continues to work in collaboration with colleagues from those municipalities who have experience with air quality and are familiar with data collection procedures.
- → Yucatán collaborated with an academic institution and a state-level research centre regarding research on inventory issues to improve the compilation of data.

Aligning with the national level

- → Jalisco held calls with Mexico´s national institute on ecology and climate change to understand which data collected for the compilation of the national-level GHG inventory could be used at the state-level. They also learned how this compilation was planned to change in the future with regards to methodologies, so Jalisco could stay aligned with the national level.
- → Yucatán's land-use and forestry subsectors for the inventory were developed by the National Forestry Commission, which had relevant expertise and access to required data. Likewise, a chapter on the black carbon compound was integrated into the inventory update, according to the National Institute of Climate Change Guidelines, to align with the national inventory.
- → The data that KwaZulu-Natal relied on for the energy and agriculture sectors of the inventory came from statistics compiled by the national departments of energy and agriculture.

Focusing on the sectors most relevant for the state or region

- → Baja California focused solely on the energy sector and similarly, KwaZulu-Natal focussed on the energy and waste sectors, as well as the enteric fermentation sub-sector of the AFOLU sector.
- → Similarly, Chhattisgarh focused on the energy sector, concentrating on the sub-sectors for power stations and energy use in iron and steel plants, as well as the enteric fermentation sub-sector of the AFOLU sector.
- → West Bengal also focused on their most relevant sector, which was the forestry sub-sector of the AFOLU sector.

Compiling a GHG inventory only for a limited number of years

- → Jalisco compiled its GHG inventory for 2010-2017, although the state would have preferred a longer time-series going further back.
- → Yucatán is updating its inventory for 2014-2018, these years were chosen due to the availability of economic and human resources. The state will also seek further financing in order to carry out another inventory update for more recent years.

Using and improving processes

- → Yucatán focused on using the compilation templates from the GHG inventory compilation toolbox, previously referenced, which made their compilation process more efficient. This also facilitated the documentation of data and methodologies, which will improve the efficiency of future compilations.
- → Pernambuco used the GHG inventory compilation toolbox to record the activities performed during the compilation of the inventory and plan necessary improvements for the next inventory cycle.
- → Jalisco asked their consultants to document data sources and methodologies.
- → KwaZulu-Natal is also using the GHG inventory toolbox, in particular to document the activity data and emission factors used to estimate emissions.

Conclusion

This paper highlighted some of the typical challenges related to limited resources in states and regions undertaking GHG inventory compilation and mitigation actions tracking. It also presented a number of solutions to these challenges, as well as practical examples of how such solutions were implemented by states and regions supported in the project.

Key solutions discussed include starting small and focussing on the sectors or actions most relevant to the state or region, adding the remaining sectors and actions slowly over time; identifying resources available outside the core team, e.g. capacities, data, processes and tools, and building on these to the extent feasible; forging collaborations with other institutions at the state or regional level as well as with the national level; and planning for the long-term by establishing processes and tools to carry out the work more efficiently.

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