



*Concept for Climate Service Index Development  
Case from CSI*

On behalf of:

In cooperation with:



The Federal Republic of Germany



As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

Published by:  
Deutsche Gesellschaft für  
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices  
Bonn and Eschborn, Germany

Friedrich-Ebert-Allee 32 + 36 53113 Bonn, Germany  
T +49 228 44 60-0  
F +49 228 4460-17 66

E [info@giz.de](mailto:info@giz.de)  
I [www.giz.de](http://www.giz.de) ; [www.adaptationcommunity.net](http://www.adaptationcommunity.net)

The Project Enhancing Climate Services for Infrastructure Investments (CSI) is part of the International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative on the basis of a decision adopted by the German Bundestag.

Responsible/Contact:  
[benjamin.hodick@giz.de](mailto:benjamin.hodick@giz.de)

Authors:  
Katharina Lotzen (GIZ)

URL links:  
This publication contains links to external websites. Responsibility for the content of the listed external sites always lies with their respective publishers. When the links to these sites were first posted, GIZ checked the third-party content to establish whether it could give rise to civil or criminal liability. However, the constant review of the links to external sites cannot reasonably be expected without concrete indication of a violation of rights. If GIZ itself becomes aware or is notified by a third party that an external site it has provided a link to gives rise to civil or criminal liability, it will remove the link to this site immediately. GIZ expressly dissociates itself from such content.

On behalf of  
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany

GIZ is responsible for the content of this publication.

Printed on 100% recycled paper, certified to FSC standards.

Eschborn/Bonn 2019

## Contents

1. Background Information on the Concept of the CSI-Index for Outcome Indicator 0.1 .....	5
2. How the Index works .....	6
a. Use (adoption)-Index .....	6
b. Climate-Service-Index.....	7
c. Index calculation .....	8
3. Interpretation of the Results .....	8
4. Index clusters, criteria and area of CSI influence.....	10

## 1. Introduction

Every year, emerging economies and developing countries invest billions in long-term infrastructure projects. However, their plans often fail to take account of future climate change. This leads to high risks of damage and misguided investments that harbour potentially serious consequences for the economy and society. Many countries – amongst them Brazil, Costa Rica and Viet Nam – have now launched efforts to raise the resilience of their infrastructure, prioritising this as a target in their (Intended) Nationally Determined Contributions ((I)NDC). Known as Climate Services, user-specific and customized climate information and products (e.g. risk and vulnerability assessments) that enable public and private decision-makers to manage climate risks and opportunities form a major cornerstone for achieving this target. Many countries so far lack the institutional, technical and service-related capacities they need to set up and mainstream Climate Services in their planning procedures and regulations. Amongst the first international initiatives to take up this challenge is the Global Framework for Climate Services (GFCS) of the World Meteorological Organization (WMO). The project Enhancing Climate Services for Infrastructure Investments (CSI) forms part of Germany's International Climate Initiative (IKI). In accordance with a resolution by the German Bundestag the IKI receives backing from the country's Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

### **CSI Background Information:**

CSI aims to empower decision-makers to make greater use of Climate Services when planning infrastructure investments and thus help increase infrastructure resilience. In this way, it is helping to achieve the UN Sustainable Development Goal (SDG) 9. How to evaluate the impact of a project's outcome is therefore of utmost importance. However, the multiple interacting factors, the different context among the countries and the long-term effect poses some challenges when measuring the scope of CSI. Gathering, defining and selecting criteria that better portrayed all enabling conditions for increasing the use of Climate Services help forwards. Having said that, CSI developed a composite Climate Service Index for the assessment of the impact on the provision and use of climate services within each partner country. As two sides of the same coin; provision and use are separately assessed. Whereas User-Index establishes important conditions for the use of CS by managers and planners in infrastructure investments, the CS-Index focuses on the quality of the service based on the five pillars of the Global Framework of Climate Services. Even though, CSI's support does not encompass all possible criteria, it still shades light into the influence of the project on the climate services among all partner countries.

## 2. Background Information on the Concept of the CSI-Index for Outcome Indicator 0.1

### Assumptions and challenges measuring Outcome Indicator 0.1

- The increase of use of Climate Services is depending on many interacting factors, that also go beyond the scope of the CSI project.
- Given the long time-spans in which infrastructure projects are being implemented, CSI will have little impact on the direct use of CS in ongoing investment projects. This implies rather looking at the conditions of CS delivery and the use of CS for the climate proofing of infrastructure investments.
- In each partner countries these conditions vary, as well as the areas of intervention vary, too. Hence, for index development, country specific conditions and contexts have to be reflected in the definition of the assessment criteria.

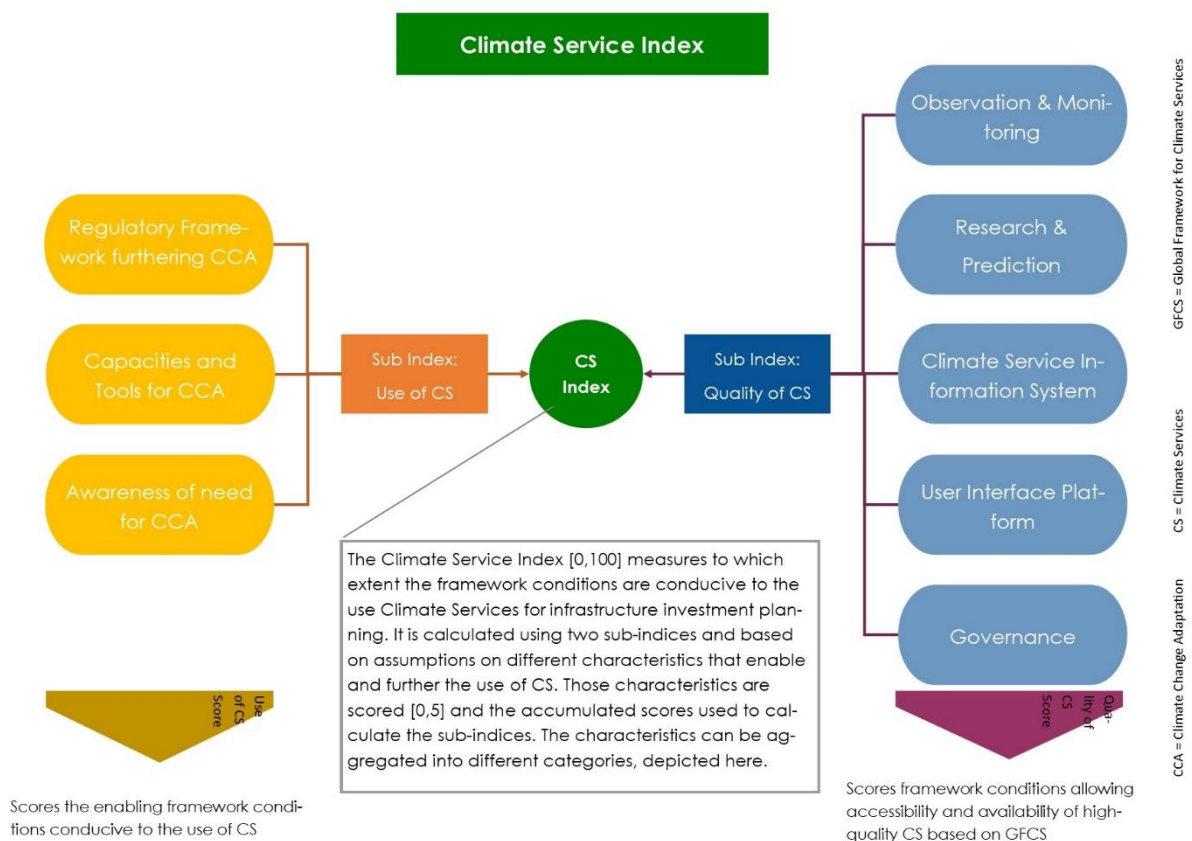
### The solution identified

- Defining assessment criteria for index and composite index construction that allow depicting all enabling conditions for the increasing use of CS in infrastructure investments. Although, not all criteria are dealt with in the context of CSI, the index can be used to understand the “influence / impact sphere” of CSI, and especially identify which aspects are beyond CSI’s impact sphere. Please compare bellow (Table 1) the criteria that CSI has an impact on.
- Developing an index and composite index that measures / scores:
  - a. the quality of CS delivery only in the defined impact sphere of CSI (some, not all criteria defined) --> *CS Service Delivery Index (termed CS-Index)*;
  - b. the quality of enabling framework conditions for CS use only in the defined impact sphere of CSI (some, not all criteria defined) --> *CS Use Index (Termed U-Index)*;
  - c. change rates / progress rates due to CSI intervention (% rates – as asked by the Indicator) based on calculating baseline, target and current values;
- Refrain from interpreting absolute numbers of the index, as it has no information value:
  - a. *CSI focusses only on the pilot sector (not entire country) and regions (e.g. subnational) in the partner countries.* This means for the Index also focusing on collecting information only in those topics (criteria of the index) where CSI has an impact. Hence, the index does not measure the entire country level conditions.
  - b. Inability to compare countries is their performance due to the differences in available information, different sectoral and different regional scope of CSI activities.
  - c. Using the entire spectrum of identified criteria for calculating maximum scores, but only measuring those where CSI has an impact sphere. Hence, the absolute number of the index has no information value.

### 3. How the Index works

#### Composite Index Concept

The index is a composite index. The basic idea is to approach the use of CS from two sides, the USE side in terms of capturing what makes infrastructure planners and managers use CS (measured by the U-Index) and the PROVIDER side of CS, capturing determinants of the quality of Climate Services (measured by the CS-Index). The index runs from 0 to 100 (Normalized scoring values for the criteria and indicators).



#### a. Use (adoption)-Index

The basic idea of the U-index is to capture the conditions for the USE or ADOPTION of Climate Services. As shown in the illustration of the index, the U-index is subdivided into 3 categories which together contribute to an enabling environment for incentives the use of CS. Again, these categories are limited to the ones CSI actually has an impact on and definitely do not capture everything that may impact the use of CS. Other categories one may imagine, like adaptation funding for example, are left out. One reason behind this is not only to avoid unnecessary effort but also to avoid the index changing without CSI actually being the cause (e.g. because another international organization may influence the results). The categories have been selected after studying a variety of adaptation indicators. They are evaluated using a scoring system (see below). The scoring results are normalized (this is what the max-values are used for) and weighted, with the weights being depicted in the upper-right-table. Weights cannot be **changed!**

The clusters consist of:

- **Regulatory incentives:** This weighted highest as most participants in the baseline survey gave regulatory incentives as major deciding factor for whether they use CS or not. It summarized a variety of scored criteria capturing how far the regulatory framework incentivizes/ forces the use of CS.
- **Awareness:** Many adaptation indicators also capture the awareness of the need to take action, which is a necessary condition for stakeholders to take action for resilience. There are different depths of awareness, as captured by the respective scoring criteria, from just having basic knowledge up towards truly acting upon said knowledge.
- **Tools & Capacities:** Even if regulation and awareness exist, action and the effectiveness of action also depend on the necessary capacities and tools being available to implement strategies and regulation. Its important to note that, this being the Use-Index, here we only capture capacities for the use of Climate Services. Capacities for the provision are captured in the CS-Index.

#### **b. Climate-Service-Index**

Generally, the CS-Index follows along the same lines as the U-Index. The difference is that it aims at capturing the PROVISION / quality of Climate Services. The clusters for which specific criteria have been developed are in line with the provisions and key pillars of the WMO - Global Framework for Climate Services (GFCS):

- **Climate Monitoring & Observation**
- **Climate Research & Prediction**
- **Climate Information System**
- **User-Interface**
- **Governance (added by CSI)**

### c. Index calculation

The following calculation scheme has been applied:

1. Calculation of the **U-Index and CS-Index values** for all countries and their total values for the
  - a. **TARGET** (i.e. what would be the index value based on the activities we expected to happen when we determined the target values for the indicator, both at the beginning of CSI and during the elaboration of the prolongation offer)
  - b. **BASELINE** (i.e. the situation before CSI intervened/ existed) and the
  - c. **CURRENT**, which shows the current situation after each updating of the index.

		0= not fulfilled 5= entirely fulfilled		
		Bewertung 0-5	Bewertung 0-5	Bewertung 0-5
Cluster 1: Regulative framework	Criterion 1 (siehe Tabelle 1)	Baseline	Target	Current
	Criterion 2	Baseline	Target	Current
	Criterion 3	Baseline	Target	Current
Cluster 3: Tools & Capacities	Criterion 1	Baseline	Target	Current
	Criterion 2	Baseline	Target	Current
	Criterion 3	Baseline	Target	Current
Cluster 2: Awareness	Criterion 1	Baseline	Target	Current
	Criterion 2	Baseline	Target	Current
	Criterion 3	Baseline	Target	Current

Figure 1: Example for Scoring each criterion for a defined index cluster.

2. The **weights for the two sub-indices**, which are 0.45 for the U-Index and 0.55 for the CS-Index. The CS-Index is weighted slightly higher because of the argument that without having good CS mechanisms in place, they cannot be used in processes of climate proofing. For CSI the quality of CS is an important condition for uptake in infrastructure investments.
3. The **change rates both in the sub-indices**, both for the
  - a. target (again, we used this value to determine the target values for the indicator) and the
  - b. current (which is used for our reporting).
4. **The same information for the composite index** that adds up the weighted sub-indices.

## 4. Interpretation of the Results

The CS-Score is identical to the U-Score in how it is calculated. As with the U-Score, we decided to try our best to incorporate as many relevant criteria under the different categories as we thought would be needed to meaningfully enhance the quality of CS. This has the effect that the CS-Index generally grows a lot less than the U-Index, upon which we have much more influence as a project. In the field of CS, on the other side, many changes in terms of technology and institutions require substantial institutional reform and financial investments which are beyond the scope of CSI. At the same time, including the governance category, we wanted to highlight that it is not all about investing in technology, but a lot can be achieved by building networks and streamlining processes, which is an area where CSI has much more potential to support.



**Rationale for Index Calculation Scheme: Focus on rates of change, then comparable index values**

U-INDEX	CS-INDEX
<ul style="list-style-type: none"> <li>As it is only relevant for us <u>how the index changes</u> (compare indicator CSI 0.1 Indicator definition), which defines the target value for the indicator, scores on which CSI does not have any impact and that we do not expect to change are not relevant and can be ignored (which is also why sometimes you find criteria which are 0 for TARGET, BASELINE and CURRENT).</li> <li>Note however, that this does not mean that these criteria can be deleted, as more criteria being included leads to a higher MAX value which has an impact on the overall value of the index. We included some criteria on which CSI does not have any impact as we feel that they are an integral part of their respective category and should be taken into account. It shows that after the end of CSI, there is still work left to do. It also indicates what the next steps for further institutionalization should be. This also has the added benefit of dampening index growth and not having unrealistic index growth.</li> </ul>	<ul style="list-style-type: none"> <li>What also needs to be kept in mind (and may be seen as an inconsistency in the index) is that unlike for the U-Index, we do not limit ourselves as much in terms of the area of interest, as this does make sense for some criteria. Accordingly, some criteria are applicable on the national level (e.g. for observation and monitoring). Additionally, as we used the national level for the provider side of the baseline assessments, we also needed to apply them for the scoring. This is another factor that makes the CS-Index grow much less than the U-Index, where the baseline assessment was more sector-specific.</li> <li>In the construction of this scoring table, we were thinking mainly of the big picture. As argued above, also due to the way the baseline assessments were set up, the focus of the CS-Index is not as closely to our pilot sectors as for the U-Index. This needs to be kept in mind when thinking about the scoring for a given criterion. Impacts of any CSI activity need to be scored according to this logic. E.g. a training on data management in Costa Rica does not lead to a jump from a 1 to a 5, as it is unlikely that data quality will be perfect after just one training.</li> </ul>

## 5. Index clusters, criteria and area of CSI influence

The following table shows cluster specific criteria elaborated in cooperation with the DWD.

Green marked cells indicate the spheres of CSI Impact, for which target, and current scores have been allocated for calculating change rates as requested by Indicator 0.1. For all criteria and countries, a baseline scoring has been conducted, but those criteria not being addressed by CSI had not been considered in the index calculation, as no rate of change is expected. Still, the possible maximum score has been calculated and used for index calculation based on all criteria listed in the following table. This approach provided a realistic estimation of rates of CS improvement due to CSI intervention.

Table 1: CSI Index-Criteria and Spheres of CSI Impact in the context of a holistic perspective of Climate Services

Climate Service Delivery Index Criteria (CS-Index)					
GFCS Pillar / Index Cluster	Criteria	Brazil	Costa Rica	NBI	Vietnam
<b>Observation &amp; Monitoring</b>	All relevant climate variables (Essential Climate Variables (ECV's), climate phenomena and weather events are comprehensively observed and monitored as well as socio-economic, biological, and environmental variables.				
	The monitoring and observation of climate variables is nationwide (see interpretation) evenly covered and at appropriate density				
	Available time series of climate variables are complete and at of adequate length (> 30 yrs).				
	All observing systems are technical coordinated and observation data from all sources is consolidated into one central data base.				
	Observation data from all observation systems are transferred to the data base in near real-time.				

Climate Service Delivery Index Criteria (CS-Index)					
GFCS Pillar / Index Cluster	Criteria	Brazil	Costa Rica	NBI	Vietnam
	The interaction of various climate observers is centrally coordinated and harmonized and the transfer/sharing of data and information is stipulated by contract.				
	There are funds and/or structures available which enable a frequent technical up-grade of observing systems, frequent training/employment of staff on technical innovations and the establishment of cooperation with other climate observers				
<b>Research &amp; Prediction</b>	There are frequent research activities on the development of specialized (sector-specific) climate information products.				
	There are frequent research activities on the enhancement of predictions and projections and predictability of climate phenomena at various scales. (including regional climate centers)				
	There are special (research) activities in place which translate research outputs into applicable climate information products.				
	The interaction of climate research institutions as well as practitioners of CS provision is coordinated and institutionalized and the transfer/sharing of data and information is stipulated by contract				
	There are funds and/or structures available which enable continuous research activities, training/employment of scientific staff and the establishment of cooperation with other academic institutions				
<b>Climate Service Information System</b>	Appropriate quality-management structures and processes for climate data and products are implemented and standardized.				
	Climate products which describe the historic and current climate at various temporal and spatial scales are standardly produced.				

Climate Service Delivery Index Criteria (CS-Index)					
GFCS Pillar / Index Cluster	Criteria	Brazil	Costa Rica	NBI	Vietnam
	Predictions and projections of future climate states provided by regional or global stakeholders can be processed and value-added or even produced on the national level. This includes the provision of climate watches, forecasting seasonal climatic anomalies and projecting long-term trends that could affect climate-sensitive sectors				
	Sector-specific tailored climate products are produced which cover a range of social, economic and environmental contexts as well as all elements of climate risk management				
	Climate information products off all scales (historic, current, future) are disseminated to users in government, the general public, and academia as well as to a diverse set of specialist users.				
	The entire product portfolio is centrally marketed (i.e. visibility and transparency of products and services) and accessible (e.g. product portal optionally with purchase system).				
	All stakeholders who contribute to CSIS processes on a national level (i.e. researchers, CS providers) are centrally coordinated and institutionalized and the transfer/sharing of data and information is stipulated by contract.				
	There are funds and/or structures available which enable a continuous enhancement of the product portfolio, training/employment of scientific staff on new products and services and the establishment of cooperation with new climate service providers				
<b>User-Interface Platform</b>	A help-desk is in operation which enables the user to contact the provider and formulate product needs, give feedback and ask for support and advice on available climate information products.				
	Regular fora for sector-specific users are implemented and institutionalized which enables direct user-provider interaction in terms of dialogue				

Climate Service Delivery Index Criteria (CS-Index)					
GFCS Pillar / Index Cluster	Criteria	Brazil	Costa Rica	NBI	Vietnam
	(exchange on needs and capabilities), feedback, evaluation and outreach on Climate Services.				
	User-specific advice, support and guidance for the entire product portfolio is provided.				
	Structured process are in place which integrate user needs in the product development process.				
	A cooperating agreement with all sectoral user communities, unions and line ministries is in place which determines a continuous interaction and the transfer of data and information products.				
	There are funds and/or structures available which enable a continuous enhancement of the user interaction process, training/employment of scientific staff on the interaction with users and the establishment of cooperation with new user groups.				
<b>Governance of CS</b>	A national strategy/policy for climate services is adopted and implemented.				
	National Climate Service providers have an official mandate for the provision of Climate Services and their organizational structure is aligned accordingly in order to fulfil this mandate.				
	There is a open data access regulation adopted and implemented on the national level.				
	Roles and responsibilities within the National Framework for Climate Services are clearly allocated and centrally coordinated.				

**Climate Service Use Index Criteria (U-Index)**

<b>CS Adoption Index Cluster</b>	<b>Criteria</b>	<b>Brazil</b>	<b>Costa Rica</b>	<b>NBI</b>	<b>Vietnam</b>
<b>Regulator Framework</b>	National Climate Change Policy				
	Horizontal Integration: Sectoral Policies				
	Climate Proofing Regulations				
	Technical Guidelines on the application of the regulation exist				
	Climate Proof Plans				
	Climate Proof Plans are implemented				
<b>Awareness</b>	Stakeholders are aware of the impacts of climate change for their sector/ region				
	Stakeholders are aware of the need to use Climate Services for operation, planning and management of infrastructure				
	Stakeholders know of tools, methodologies and resources to use and provide Climate Services for infrastructure planning, operation and management processes				
	Stakeholders request CS for their planning processes				
<b>Tools &amp; Capacities</b>	People have been trained in the application of the tool/ Climate Risk Management approaches				
	Capacities for trainings on climate proofing tools have been developed within the country (ToT)				
	A guideline for the application of the tool/ a methodological guide exists				

CS Adoption Index Cluster	Criteria	Brazil	Costa Rica	NBI	Vietnam
	The training on the tool has been institutionalized				
	There exists official guidance / sanction on what tools to use				