

# Theory of Change in SERVIR: A Key to Monitoring, Evaluation and Learning

Raymond French and Betzy Hernandez  
SERVIR Science Coordination Office



SERVIR connects space to village by helping developing countries use satellite data to address critical challenges in food security, water resources, weather and climate, land use, and natural disasters. A partnership of NASA, USAID, and leading technical organizations, SERVIR develops innovative solutions to improve livelihoods and foster self-reliance in Asia, Africa, and the Americas.

SERVIR 'hubs' develop a range of services for stakeholders  
Services are developed using a 'Service Planning Framework'

SERVIR-NASA/USAID

SERVIR-WA

SERVIR-HKH

SERVIR-E&SA

SERVIR-Mekong

TBD SERVIR-Amazonia



Agriculture & Food Security



Water & Water-Related Disasters



Land Cover  
Land Use Change  
& Ecosystems



Weather & Climate

SERVIR 

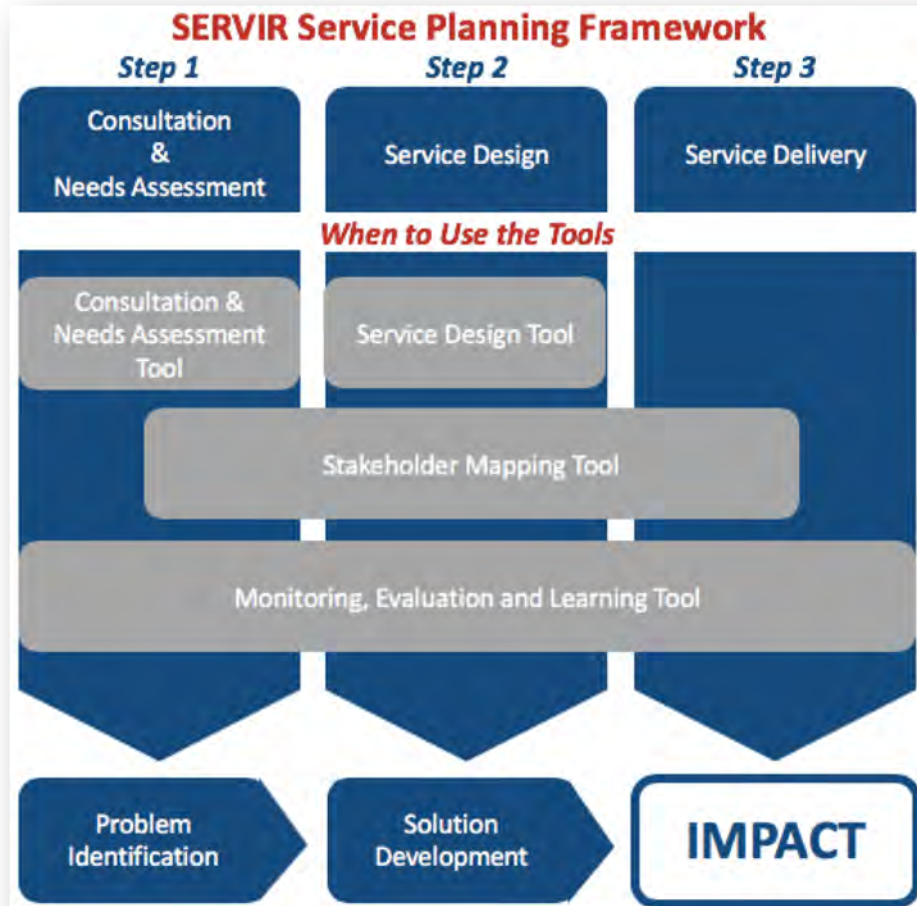


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# SERVIR Service Planning Framework and Toolkit



The Service Planning Framework concept was introduced into SERVIR in 2016 and underwent a process of refinement, resulting in the development of the Toolkit and integration into service development beginning in late 2017.

SERVIR Service Planning Toolkit  
19 September 2017



[bit.ly/2IzkNsL](https://bit.ly/2IzkNsL)



# Theory of Change (ToC) in SERVIR's Service Planning Toolkit



THEORY OF CHANGE	
<b>Impact</b>	<ul style="list-style-type: none"> <li>Improved land policy implementation processes</li> <li>Improved processes in resettlement and rehabilitation processes</li> </ul>
<b>Outcomes</b>	<ul style="list-style-type: none"> <li>Use of the land based decision support tool in decision making</li> <li>Improved decision-making processes on resettlement and restoration</li> </ul>
<b>Outputs</b>	<ul style="list-style-type: none"> <li>Maps</li> <li>Training material</li> <li>Web tool</li> <li>People trained</li> <li>Consultation needs assessment report</li> <li>Methodology</li> <li>Technical report</li> <li>Processed datasets</li> </ul>
<b>Inputs</b>	<p><b>INPUTS:</b></p> <ul style="list-style-type: none"> <li>Data resources; e.g.: land cover, elevation, master plans, forest management plans, land management policies, soil maps etc.</li> </ul> <p><b>ACTIVITIES:</b></p> <ul style="list-style-type: none"> <li>Stakeholder consultations</li> <li>Data acquisition and processing</li> <li>Methodology development</li> <li>Tool development (designing, prototyping, testing, deployment)</li> <li>Training/capacity building                             <ul style="list-style-type: none"> <li>Advanced GIS training to support the Rwanda Land Based Decision support tool</li> <li>Capacity building in using the Rwanda Land Based Decision support tool</li> </ul> </li> <li>Dissemination (user outreach)- Web based tool</li> </ul>
<b>Assumptions</b>	<ul style="list-style-type: none"> <li>Quality and updated data will be provided by the identified focal points on time</li> <li>The tool will be hosted, used and sustained by identified institution for decision-making</li> <li>That the tool's outputs will be accurate</li> </ul>
<b>Leveraging other opportunities</b>	This service is based entirely on leveraging existing government agency activities to align data sources and leverage them into a single service that will support cross-cutting land use processes.
<b>Sustainability strategy</b>	Continuous user engagement of targeted stakeholders during the service development coupled with trainings in GIS and capacity building in use of the tool will assist in uptake of the tool and provide skills required to maintain and update dynamic datasets in the tool.

There is not a single, one size fits all, approach to implementing a Theory of Change. Different methodologies should be applied depending on the desired impact and complexity of the stakeholders and intermediate steps involved.

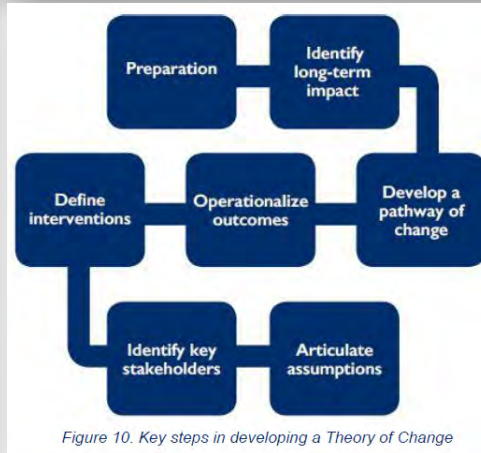


Figure 10. Key steps in developing a Theory of Change



Figure 13. The flow of transforming about change. The complexity of the service will determine how many levels of outcomes are required.



Figure 11. Simple overview of Theory of Change pathway

# Example 1: a ToC in Practice, SERVIR-West Africa - Charcoal Production Monitoring & Land Management in Ghana



<b>SERVICE TITLE:</b>	Monitoring Impacts of Charcoal Production in W. Gonja and Sene Districts, Ghana for Sustainable Land Management
<b>Service problem area:</b>	Adaptation <input type="checkbox"/> Sustainable landscapes <input checked="" type="checkbox"/> Land Use/Land Cover and Ecosystem Services
<b>Geographic Coverage:</b>	Gonja and Sene Districts, Ghana
<b>Problem Analysis:</b>	Charcoal production degrades environmental services and thus does not contribute equitably to livelihoods in the region. Charcoal is produced by an itinerant population in the area on areas normally under the traditional authorities (skin land). This results in forest degradation, soil fertility loss, erosion, biodiversity loss, wildfires, and air quality. Local communities and authorities lack adequate information to address these negative impacts. Improved information on charcoal production would help communities find alternative activities, and governmental authorities apply forest and land management policies.
<b>EXPECTED CHANGES</b>	
<b>Impact:</b>	Increased resilience of Rural livelihoods through sustainable forest resources
<b>Outcomes:</b>	<ul style="list-style-type: none"> <li>Higher rate of response of local actors (government, local authorities and local populations) to forest disturbance</li> <li>Increased communication to local actors of forest dynamics associated with charcoal production</li> <li>Increased awareness by local populations of the impacts of charcoal production</li> </ul>
<b>Direct Outputs:</b>	<ul style="list-style-type: none"> <li>Information system for communicating forest dynamics is increasingly used by local actors (local authorities and NGOs)</li> <li>National and local authorities increasingly use forest dynamics system for national policy development and application</li> <li>Messages to local communities by local authorities and/or NGOs increase in frequency and effectiveness.</li> </ul>
<b>Major Activities:</b>	<ul style="list-style-type: none"> <li>Creation of an information platform that monitors and presents changes in forest cover, fires and scarring, and location of charcoal production sites.</li> <li>Creation of a means of providing messages on forest dynamics to local populations</li> <li>Training provided to intermediaries (local authorities and NGOs) on the use of the information platform</li> </ul>
<b>Implementing/Development Partners:</b>	Technical: CERSGIS, NASA, (SDSU, AGHYRMET), IWMI, (WABICC), WASCAL Implementation: AROCHA, Solidaridad, Forestry Commission, EPA, MoFA, Energy Commission, District Assemblies (W. Gonja and Sene), Traditional Authorities
<b>Assumptions &amp; Risks</b>	<ul style="list-style-type: none"> <li>Alternatives to charcoal are available and used</li> </ul>

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The ToC was the outcome of a user consultation & needs assessment conducted by SERVIR-West Africa with national stakeholders in Accra in June 2017.



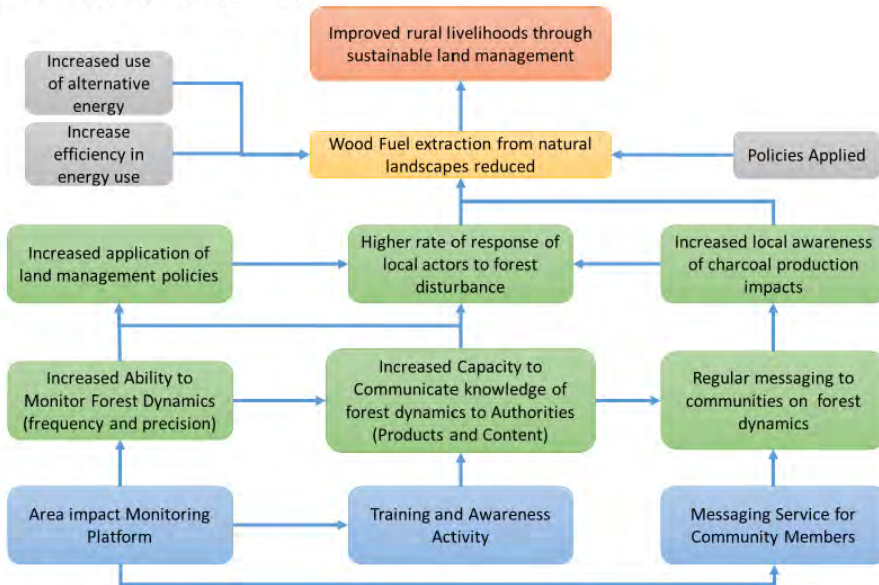
# Example 1: a ToC in Practice, SERVIR-West Africa - Charcoal Production Monitoring & Land Management in Ghana



## Theory of Change

The theory of change reflects:

- Anticipated impact (orange),
- The outcome (yellow),
- Outputs (green),
- Inputs/Activities (blue) and
- Assumptions (grey)



## Service Tracker



A National consultation was held in August 2016 to identify the specific priorities. A stakeholder workshop was held in May 2017, which resulted in identifying the need for charcoal monitoring. A follow-on workshop was held in July 2017 to develop the theory of change and begin the draft of the concept design.

This service design is still in the early stages of development (left blue). A Service Concept has been drafted, by consortium member CERGIS, based on the consultation. This will be followed by specific Product Definition Document(s), Training Definition Documents(s) and Data Sharing Definition Documents(s) as needed.

# Example 2: a ToC in Practice, SERVIR-Mekong - Enhancing Drought Resilience and Crop Yield Security in Vietnam



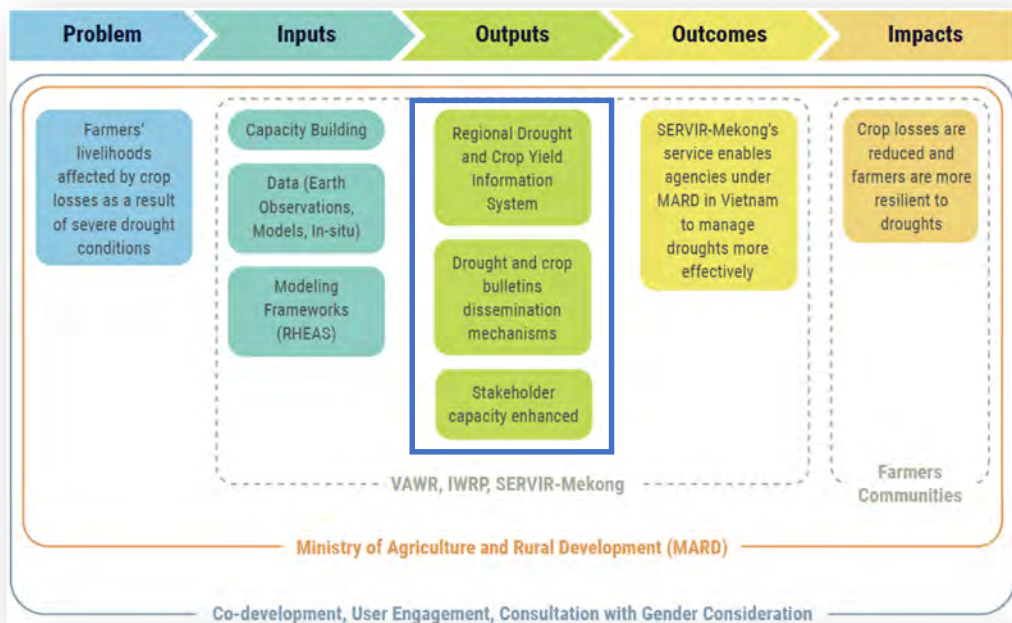
SERVICE TITLE: Enhancing Drought Resilience and Crop Yield Security in Vietnam	
SERVICE OVERVIEW	
Development problem	The Mekong region is heavily reliant on rice and certain cash crops for their national and local economies, rural livelihoods, food security and associated impacts such as income, health and nutrition. Rice is a water-intensive plant, and is affected by drought, caused by both under-allocation from irrigation systems and the limited amount of rain during dry seasons. Drought impacts the Lower Mekong on a frequent basis, and it is thought climate change will change the monsoon and tropical storm patterns which makes planning water allocation challenging. Although it is not known whether climate change will affect the average water levels in the system over the year, it is already changing the frequency, intensity and timing of wet and dry spells, upon which farming patterns and reservoir management is based. To be more resilient to drought and its impacts on crop yield and therefore food security, farmers, water resource managers and agricultural authorities need advance warning of dry spells, the ability to monitor drought and crop yields and to feed this into adaptive and inclusive agricultural planning processes.
Problem specification	<p>In Vietnam, technical agencies advise the Ministry of Agriculture and Rural Development (MARD) on forecasted water availability with a focus on dry spells; monitor current conditions; and provide information to the department responsible for detailed plans for rice, coffee, cashew and other cash crop planting and harvesting. Other water security issues also rely on appropriate water allocation decisions in the agricultural sector, including urban, industrial and domestic water supply. MARD's Directorate of Water Resources (DWR) works with other departments to negotiate water allocations in times of low rainfall. DWR requires three-month early warnings, or as long lead time as possible, but are concerned about the level of accuracy.</p> <p>Currently the national and provincial systems do not provide agencies mandated to monitor and forecast agricultural drought with information of sufficient accuracy and temporal resolution to ensure food security and robust livelihoods for farmers. The Prime Minister has directed the Vietnam Academy of Water Resources (VAWR) to seek a method for accurate drought forecasting. This service seeks to improve VAWR's ability to forecast and monitor drought conditions to inform better mitigative decision-making by MARD, including salt-water intrusion, water allocation and distributing compensation and other social welfare initiatives.</p> <p>The differential impacts on different genders and ethnic minorities of drought and low crop yield are not fully understood, though local or provincial level studies are uncovering lessons that may be built into the theory of change for this service. Clear gaps in mandates and targeted warning</p>

THEORY OF CHANGE	
Impact	<ul style="list-style-type: none"> <li>Farmers have longer to plan changes to livelihoods – through national agricultural participatory planning framework</li> <li>Increased yield, lower loss</li> <li>Farmers have sufficient water, lower loss or waste in times of drought</li> </ul>
Outcomes	<ul style="list-style-type: none"> <li>VAWR use improved water balance information to integrate their Reservoir Water Management Information Portal, bulletins and reports, etc.</li> <li>VAWR use improved drought related information to integrate their drought bulletins, reports, etc.</li> <li>MARD have improved technical advice on water management</li> <li>Water Management and Agricultural Planning Agencies better able to make informed decisions on water allocation, reservoir operations, and</li> </ul>
	provide accurate information to farmers, farmers unions and other sectors involved in mitigating and responding to drought (e.g. health and social welfare sector - to be explored)
Outputs	<ul style="list-style-type: none"> <li>Integrated RDCYIS available using RHEAS and DSSAT models, and data streams, including rainfall streams designed to feed into VAWR's modelling systems, supported by guidance from local information, which includes a planned validation study</li> <li>VAWR and associated other partners capacitated to use and modify RDCYIS to suit their current needs, which includes specific drought indices and web dashboards in Vietnamese to modify to suit irrigated systems in future, supported by training and guidance materials</li> <li>Improved drought forecasts and user-specific indices (1 and 3 months) including Vegetation Health Index (VHI) delivered to secondary users (MARD and National Mekong Committees) to be communicated to sub-national level for decision-making and mitigative action through specific advisory bulletins for planning decisions</li> <li>VAWR to develop advisory report template to be communicated. The main information provided by this service will be drought indices and water balance variables which will be provided at the country level</li> </ul>

The ToC was the outcome of a user consultation & needs assessments conducted by SERVIR-Mekong with stakeholders in Thailand, Vietnam, in early 2016.



# Example 2: a ToC in Practice, SERVIR-Mekong - Enhancing Drought Resilience and Crop Yield Security in Vietnam



## REGIONAL DROUGHT AND CROP YIELD INFORMATION SYSTEM APPLICATIONS



Improving the operational, technological, and institutional capabilities to prepare for and respond to droughts



Assisting local governments and the agricultural sector with seasonal drought forecasting and in implementing short and long-term mitigation measures during and in advance of droughts



Providing crop yield estimation to make better decisions on seasonal cropping



Scientist inspecting the sign of severe drought in the rice field in Ba Tri district, Ben Tre

(Photo Credit: Leo Sebastian/CCAFS SEA)

A SERVIR-Mekong user engagement specialist helped formulate Service Concept in round-table discussions. A Gender specialist also conducted interviews in Ninh Thuan Province, highlighting the diverse, local challenges around drought and water availability.

This service design has matured to the point where VAWR is running the Regional Hydrologic Extremes Assessment System (RHEAS), a component of the service, themselves (output/outcome).





# The 1<sup>st</sup> of 2 SERVIR Impact Assessments: Key Points



## Management Systems International (MSI) – “Performance Evaluation of SERVIR”

- USAID funded 3-Year Study (2013-2016); required significant monetary investment
- 3 region-specific surveys, spanning 35 countries with 400+ SERVIR clients
- 9 SERVIR product case studies
- 2 valuation studies: Damage and Loss Avoidance Measurement and Contingent Valuation Method
- 300+ interviews and 7 focus groups across 10 countries: Bangladesh, El Salvador, Guatemala, Kenya, Nepal, Panama, Rwanda, Tanzania, Uganda, Zambia
- Two (of many) Key Findings
  - Higher likelihood of success when decision-making contexts are better understood prior to product development and that products be embedded into existing systems and decision-making processes.
  - SERVIR should establish clear theories of change for products to improve its ability to monitor and evaluate product performance in the future.
  - **Both Led to adoption of The SERVIR Service Planning Framework.**

## The 2<sup>nd</sup> of 2 SERVIR Impact Assessments: Key Points



### RTI International - “NASA SERVIR Study Update: Valuing the Impact of Flood Early Warning in Bangladesh”

- SCO funded 1-Year Study (2017); required moderate monetary investment
- 19 Key informant interviews from the public and NGO sectors
- 4 Focus groups
- Directly surveyed 2,247 households in the Brahmaputra river flood plain
- Three (of many) Key Findings
  - Danger levels vary by community, and are not currently measured at the community level
  - The value of flood warning is not currently realized by most households in the flood plain
  - Danger level messages and communication infrastructure could be improved to reach more of the vulnerable population living in the flood plain
  - Reaffirmed the importance of ensuring the impact chain is fully assessed, all the way down to the community and individual level.

## Key Take-Aways and Lessons Learned



- **The SERVIR model represents a different way of doing things: partnering a space agency with a development agency to achieve lasting impact.**
- **Theory of Change and Service Planning require stakeholder engagement throughout the vertical value chain and across the horizontal development cycle to achieve impact and sustained use.**
- **Service planning and implementation are more involved than developing one-off products**
  - **Mekong example: Designing a monitoring system (as a service) vs. a single product (e.g. map or tool)**
  - **Ghana example: One size doesn't fit all; scientific challenges encountered**
- **Successful Service Planning and Theory of Change includes co-development with beneficiaries and users -> consensus, coordination, feedback loops, etc.**
- **Theory of Change is not simply a cookbook recipe, it requires thoughtful adaptation in its implementation.**
- **Other NASA Program Elements exploring the service planning framework; a paradigm shift**



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# Questions?

Connecting space to village *through science*

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