SADC Science, Technology & Innovation Implementation Framework to Support Climate Change Response

Version 5.0

Luangwa River, Zambia; early dry season 2003

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List of abbreviations

AMCEN	African Ministerial Committee on the Environment
AU	African Union
AUC	African Union Commission
AUSAID	Australian Agency for International Development
CBD	Convention on Biological Diversity
CCAM	Cubic Conformal Atmospheric Model
COP – 17	17th Conference of the Parties of the United Nations Framework Convention on Climate Change
CORDEX	Coordinated Regional Climate Downscaling Experiment
GCMs	General Circulation Models
GIS	Geographical Information Systems
HCD	Human Capital Development
ICP	International Co-operating Partners
ICT	Information and Communication Technologies
IKS	Indigenous Knowledge Systems
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Rights
MEAs	Multilateral Environmental Agreements
M&E	Monitoring and Evaluation
MOST	Ministers of Science and Technology
NEPAD	New Partnership on African Development
NPCA	NEPAD Planning and Coordinating Agency
OSI	Open Society Initiative
POP	Persistent Organic Pollutants
RISDP	Regional Indicative Strategic Development Plan
SADC	Southern African Development Community
SADC HYCOS	Southern African Development Community Hydrological Cycle Observing System
SAMCOST	Southern African Ministerial Committee on Science and Technology
START-PACOM	Global Change System for Analysis, Research and Training Pan African Committee
STI	Science, Technology and Innovation
UNCCD	United Nations Convention to Combat Desertification
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development

i. Acknowledgements

The Southern African Development Community (SADC) Secretariat would like to acknowledge the leadership provided by the Southern African Ministerial Committee on Science and Technology (SAMCOST) in mandating the development of the SADC Science, Technology and Innovation Implementation Framework to Support Climate Change Response under the coordination of the Government of the Republic of South Africa. SADC Secretariat further acknowledges the commitment of member states in the development of the Implementation Framework - specifically the leadership role played by the following member states in the various Technical Task Teams – Angola (Mitigation), Democratic Republic of Congo (Adaptation), Zambia (Systematic Observations and Monitoring) and Zimbabwe (Impacts, Vulnerability and Risks).

Appreciation is also extended to the Governments of the Republic of Namibia and Botswana for hosting the first and second workshops respectively.

Finally, the Secretariat would like to express its gratitude to the Government of the Republic of South Africa (Department of Science and Technology) and the Australian Government (AUSAID) for providing the necessary financial resources for this initiative.

Above all, the SADC Secretariat would like to commend the Government of the Republic of Namibia for their guidance and wise leadership in their capacity as Chair of SADC in steering this process to this end.

ii. Executive Summary

Southern Africa is vulnerable to the effects of climate change and it is clear that climate change is already occurring (in the form of significant trends in increased temperatures for most seasons particularly towards the interior). Accordingly SAMCOST mandated the SADC Secretariat to develop the framework to respond to the challenges presented by climate change. To that effect, four thematic areas were identified to respond to climate change in the region. These include Systematic Observation and Monitoring; Impacts, Vulnerability and Risk; Mitigation, and Adaptation. In

implementing activities related to these thematic areas, efforts would be targeted at building capacities for the region in terms of infrastructure, human capital development, institutional arrangements as well as policy frameworks.

The framework is scheduled to be implemented within a five year period, starting in 2011. Financial resources towards the development of the identified programmes would be sourced from cooperating partners at regional, continental and global levels.

To kick-start the consultative process on the development of the framework, two regional workshops were held in Namibia (August 2010) and Botswana (March 2011). Participation was drawn from senior officials and experts in member states from both Ministries responsible for Environment; and STI.

iii. Mandate

In August 2009 the SADC Senior officials responsible for STI during their meeting in Pretoria, South Africa, mandated the SADC Secretariat to coordinate the development of a regional framework on STI response to climate change.

This led to the convening of the first inter-sectoral climate change workshop which took place in August 2010, in Windhoek, Namibia, with senior officials and experts representing both the ministries of environment and STI. The NEPAD Office on Science and Technology was also represented.

During the first workshop, member states agreed to establish Task Teams to deal with four thematic issues; comprising impacts, vulnerabilities and risks (lead by Zimbabwe); systematic observation and monitoring (led by Zambia); adaptation (led by Democratic Republic of Congo), and mitigation (led by Angola). This was then followed by a second workshop in March 2011 which took place in Gaborone, Botswana; where the first draft of the SADC STI Implementation Framework to Support Climate Change Response was developed and thereafter endorsed by SAMCOST at their meeting in Windhoek, Namibia in May 2011.

1. Introduction

Climate change is the consequence of emissions intensive industrial practices and systems. As a result, responses to this phenomenon demands STI interventions that support the following of a green development pathway.

The current approach to understanding and responding to climate change in SADC is, however, quite fragmented. As a result, the STI sector in SADC is developing a research perspective to contribute to the SADC regional Climate Change programme being developed by the Environment sector, in the form of a regional STI framework to support climate change response; endorsed by the SADC STI Ministers in May 2011 (SADC/MOST/2011/8B). The process here has focused on, firstly, sharing information on activities in different SADC member states; and, secondly, developing the first draft of the SADC Regional Climate Change Implementation plan based on (and it is essential to note this) regional needs identified and agreed upon by the member states. The structure of the implementation process is intended to ensure improved participation by member states.

Climate change is, of course, one of a range of stressors affecting the subcontinent. The approach borne in mind here at all times, incorporates those STI actions that may have multiple benefits; possibly supporting the Millennium Development Goals.

2. Background

Working Group 2 of the IPCC's Fourth Assessment Report indicates that 'All of Africa is likely to warm during this century' (pg 866). Warming is highly likely to exceed global annual mean warming throughout the continent and in all seasons (Christensen *et al* 2007); while drier subtropical regions are likely to warm more than moister tropics.

Continental southern Africa is vulnerable to the effects of climate change, and it is clear that climate change is already occurring (in the form of significant trends in increased temperatures for most seasons; particularly towards the interior). With regard to more recent projections that those quoted in the IPCC Fourth Assessment Report, 15 GCMs used to derive projected climate change (by 2040-60;

relative to the 1960-2000 baseline period) show increases in average, minimum and maximum temperatures (Tadross & Davis.; SADC Climate Change Handbook 2011). Comparative analysis undertaken using CCAM projections further shows projected increased temperatures, with a higher likelihood of exceedance of thresholds critical to human and livestock health, for example (Engelbrecht 2011, Archer van Garderen 2011). Projected changes may be summarized as the increase in temperatures (which naturally promotes convective activity), an increase in humidity over much of the subcontinent, and likely decreased winter rainfall in the south west subcontinent (Tadross & Davis; SADC Climate Change Handbook 2011). Climate change is thus a matter of concern in the subcontinent, and a priority area for consideration of research and development needs to support effective response.

Under Chapter 4 of the Regional Indicative Strategic Development Plan (RISDP) the SADC region has endeavoured to put in place mechanisms for the implementation of Multilateral Environmental Agreements (MEAs) under the 1992 Rio de Janeiro Earth Summit such as the United Nations Framework Convention on Climate Change (UNFCCC); United Nations Convention to Combat Desertification (UNCCD); United Nations Convention on Biological Diversity (CBD); Basel/Bamako Convention; Persistent Organic Pollutants (POPs); and Ramsar Convention. In addition, Member States are committed to the attainment of 2000 United Nations Millennium Development Goals especially Goal 7- ensuring environmental sustainability. The 2002 Johannesburg World Summit on Sustainable Development (WSSD) demanded a balance between socio-economic and political consideration in national development. Furthermore, the framework is consistent with aspirations of the 2005 AU/NEPAD Consolidated Plan of Action in STI as well as the African Union (AU) 2007 Manifesto on Science and Technology. The framework is also cognizant of the elements contained in the 2008 SADC Protocol on STI.

In support of the above, the SADC STI Ministers at their meeting held in Windhoek, Namibia in May 2011 endorsed a SADC STI framework on climate change and further mandated the Task Teams to formulate the plan to provide the implementation framework to enhance climate change sector-based responses ((SADC/MOST/2011/8B).

3. Rationale

This document provides a high-level framework for the coordination of the implementation of a regional programme of science, technology and innovation (STI) activities in support of the climate change response in SADC region.

4. Proposed areas of S&T intervention

Four broad areas for STI interventions were identified by member states – namely systematic observation and monitoring; impacts, vulnerability and risks; mitigation and adaptation. Areas for intervention are described below, with accordant objectives, the specific STI action to be undertaken and the timeline (in years) for the objective to be met.

4.1 Systematic observation and monitoring

This focus area covers systematic long term observations in terms of country identified priorities for decision and policy support in the field of climate change.

Focus Area	Objective		Specific STI action		Output	Timeline
Systematic observation & monitoring	4.1.1	Facilitate the coordination of existing climate change data of interest - integrated, harmonized, digitized, readable, accessible and secured	4.1.1.1	Audit of existing climate data in SADC (linked to WMO audit initiatives); as well as existing initiatives addressing this objective (including UNEP; AMCEN);	Harmonized data bank; linked to existing initiatives.	5
			4.1.1.2	Archived climate data from member states to be integrated and harmonized;		
			4.1.1.3	Baseline data layers indicating observed climate created for the region;		
			4.1.1.4	High quality climate data on priority variables (rainfall, temperature, solar radiation, humidity, albedo, sunshine hours) recorded at temporary scale of 6 or 12 hours.		
	4.1.2	Strengthen remote sensing	4.1.2.1	Comprehensive audit of existing remote sensing research, operational and capacity building programmes within SADC (built on existing audits, such as those	Improved support for regional remote sensing programmes	5

	programmes		undertaken by the Group on Earth Observations); 4.1.2.2 Identify priority needs and gaps; 4.1.2.3 Development of interventions to address priority needs and gaps.	& initiatives	
4.1.3	Support the expansion of meteorological stations networks	4.1.3.1 4.1.3.2	Present network of meteorological stations extended roughly on a horizontal resolution of 100 kms (see 4.1.1.1 – 4.1.2.1 above); Weather balloon and satellite observations taken as parallel data set; and centrally archived.	Extension of the data platform and networks	5

4.2 Impacts, vulnerability and risks

Inputs from member states on impacts, vulnerabilities and risks focused on priority needs to support states and sectors vulnerable to climate change.

Focus Area	Objective		Specific STI action		Output	Timeline
Impacts, vulnerability & risks	4.2.1	Downscaling of climate change models	4.2.1.1	Support updated suite of latest downscaled models for SADC region; available in GIS format and centrally archived. (coordinated with 4.1.1.1 through 4.1.4.2 above; and with the CORDEX experiment).	Extension of the data platform	2; continuation for 4
			4.2.1.2	Support collation of impact models and data for vulnerable sectors (reference 4.4)		
	4.2.2	Management tools & techniques for vulnerable sectors	4.2.2.1	Identify research needs and gaps in vulnerable sectors (e.g. primary industries, including aquaculture);	Extension of data platform; risk and vulnerability assessment for each country (ref 4.4.3.1)	5
			4.2.2.2	Develop interventions for identified needs and gaps;		
			4.2.2.3	Archived data from member states integrated and harmonized (linked to Focus Area 4.1);		
			4.2.2.4	Risk and vulnerability modeled for		

			all member states (also contributing to 4.4.3.1);		
		4.2.2.5	Annual updated maps showing critical changes, trend and projected changes made available per member state (linked to SADC HYCOS, and other key initiatives; also contributing to 4.4.3.1).		
	4.2.3 Security of energy supply through energy demand management and diversification (including renewable and green energies)	4.2.3.1	Develop interventions per member state on existing and projected energy demand (building on existing funding and activities);	Targeted and improved energy demand planning in region; portfolio of green and renewable energies; Improved regional capacity building on diversification.	5
		4.2.3.2	Targeted capacity building for the region (linked to existing activities) on energy demand management over the next decade;		
		4.2.3.3	Develop and pilot technology innovations in renewable and green energy (e.g. charcoal alternatives, solar; biofuels);		

		4.2.3.4	Targeted capacity building for the region on diversification strategy development (where required); linked to existing initiatives.		
4.2.4	Improvement of water quality – use of appropriate technologies and innovations (such as, but not limited to, nanotechnology in purification, waste water and recycling technologies)	4.2.4.1	Develop feasibility studies as per regional priority on water quality technologies;	Regional strategy on water quality, including technology needs assessment (linked to existing initiatives).	4
		4.2.4.2	Coordinated strategy development with water sector (where required and building on existing activities) on deployment and application of feasible strategies.		
4.2.5	Research in vector borne diseases with reference to human and livestock health	4.2.5.1	Comprehensive audit of gaps and priority needs in vector borne diseases, including malaria (human and livestock health – two separate processes);	Targeted portfolio of initiatives on vector borne diseases and climate; link to regional strategy.	5
		4.2.5.2	Develop interventions in priority and gap areas;		

	4.2.5.3 Process to link project findings to regional strategy.		

4.3 Mitigation

This focus area identified priority mitigation themes focusing on technology transfer, development deployment for the SADC region.

Focus Area	Objective		Specific STI action		Output	Timeline
Mitigation (technology transfer, development and deployment)	4.3.1	Analysis of mitigation opportunities through development of carbon reduction projects;	4.3.1.1	Audit of existing carbon offset projects in SADC member states;	Portfolio of targeted carbon offset projects;	2
			4.3.1.2	Identify current gaps and priority needs;		
			4.3.1.3	Develop carbon offset projects;		
			4.3.1.4	Process to distill lessons learnt and best practice in carbon offset; including regional strategies.		

4.3.2	Scientific quantification of carbon sequestration (sinks/removal) opportunities (agriculture, forestry, land reclamation)	4.3.2.1	Comprehensive audit of existing activities on scientific quantification of carbon sequestration;		5
		4.3.2.2	Identification of priority needs and gaps;		
		4.3.2.3	Coordinated programme of research on testing different methodologies for quantification of carbon sequestration in priority land covers and uses (including quantified sequestration under conservation agriculture, reforestation and land reclamation/restoration) in SADC.		
		4.3.2.4	Capacity building programme (postgraduate HCD) on quantification of carbon sequestration for candidate SADC universities (linked to 4.3.4.1 above – each funded project to have quantified HCD component for SADC nationals).		
4.3.3	Research to identify bio-fuel options in terms of feedstock (varieties) and technology (in production side)	4.3.3.1	Identify and quantify feasible biofuel feedstock options	Portfolio of biofuel options and future strategy for SADC	4
		4.3.3.2	Develop interventions (linked to existing activities) for technology innovations in biofuel production;		
		4.3.3.3	Facilitated process to derive best practice guidelines and continuing gaps.		

4.3.4	Build efficiencies through R&D to support low carbon transit	4.3.4.1	Audit of existing activities on low carbon transit;	Portfolio of low carbon transit options and future strategy for SADC	5
		4.3.4.2	Develop interventions (building on existing activities) low carbon transit systems and feasibility thereof. The key focus here is on building on existing activities and lessons learnt.		

4.4 Adaptation

Adaptation priority needs were identified by member states with a clear emphasis on linking to activities already in place.

Focus Area	Objective		Specific STI action		Outputs	Timeline
Adaptation (technology transfer, development and deployment)	4.4.1	Downscaling of climate change models – to inform adaptation strategies and responses	See 4.2.1.1 above			2
	4.4.2	Develop portfolio of projects in green technologies	4.4.2.1	Comprehensive audit and review of existing activities in green technologies;	Portfolio of green technologies developed.	3
			4.4.2.2	Identification of priority needs and gaps;		
			4.4.2.3	Develop a portfolio of 'green technologies' initiatives, including guidelines and lessons learnt (reference 4.2.3 and Mitigation section)		
	4.4.3	Long-term adaptation scenarios	4.4.3.1	Revising vulnerability and impact assessments for all sectors using updated scenarios (ref 4.2.2, see 4.2.1.1 and 4.4.1 above);	Development of long term adaptation scenarios	5

			4.4.3.2	Costing of impacts and adaptation options (where feasible);	
			4.4.3.3	Development of long term adaptation scenarios; including likely long term costs per sector of adaptation options versus no adaptation;	
			4.4.3.4	Development of climate change/risk vulnerability Atlas for SADC, culmination of 4.2.1.1, 4.4.1 and 4.4.3.	
	4.4.4	Research focusing on the facilitation of value addition, optimization and commercialization (including appropriate IPR instruments) for indigenous knowledge systems (IKS)	4.4.4.1	Develop interventions on feasibility for integrating local/indigenous knowledge into 4.4.3.1 (e.g. indigenous farming systems and climate adaptation).	Portfolio of interventions for integration of IKS into 4.4.3.1; including strategy for commercialization and appropriate IPR instruments	4
	4.4.5	Research and development with reference to disease resistant and stress	4.4.5.1	Audit process to identify gaps in research and development for disease resistant and stress tolerance in priority crops and key species in the	Portfolio of priority R&D interventions in disease resistance and stress tolerance in priority crops and key biodiversity sector	5

	tolerant crops; and key species in the biodiversity sector		biodiversity sector (sample themes – what are the priorities, and what is currently underfunded?); Develop interventions in priority areas.	species	

4.5 Cross-cutters

Actions described here cut across all of the above identified priority areas for STI intervention. Each member state develops a portfolio of projects/activities where a country has particular interest/capacity. Portfolio plans (where relevant) are explicit in terms of :

- Policy
- Capacity building
- Research infrastructure
- Technology transfer
- Financial and technical support modalities

Possible STI actions that might be integrated into project portfolios are detailed below.

Focus Area	Objective		Possible actions to be integrated into project portfolios	
Policy	4.5.1	Enabling policy framework	4.5.1.1	Support the enhancement of enabling policy environment through activity findings;
			4.5.1.2	Development of Framework Briefs detailing programme key findings.
Capacity building	4.5.2	Institutional capacity – strengthening of research collaborations and networks, and management of institutions	4.5.2.1	Comprehensive institutional audit on existing institutions and processes;
			4.5.2.2	Gap analysis;
			4.5.2.3	Process of institutional capacity building/reform linked to gap analysis;
			4.5.2.4	Facilitated process of communication of 4.5.1.1 material to key decision makers in the region;
			4.5.2.5	Support SADC Environment Desk in integration of 4.5.1.1 material in strategy and policy formulation.

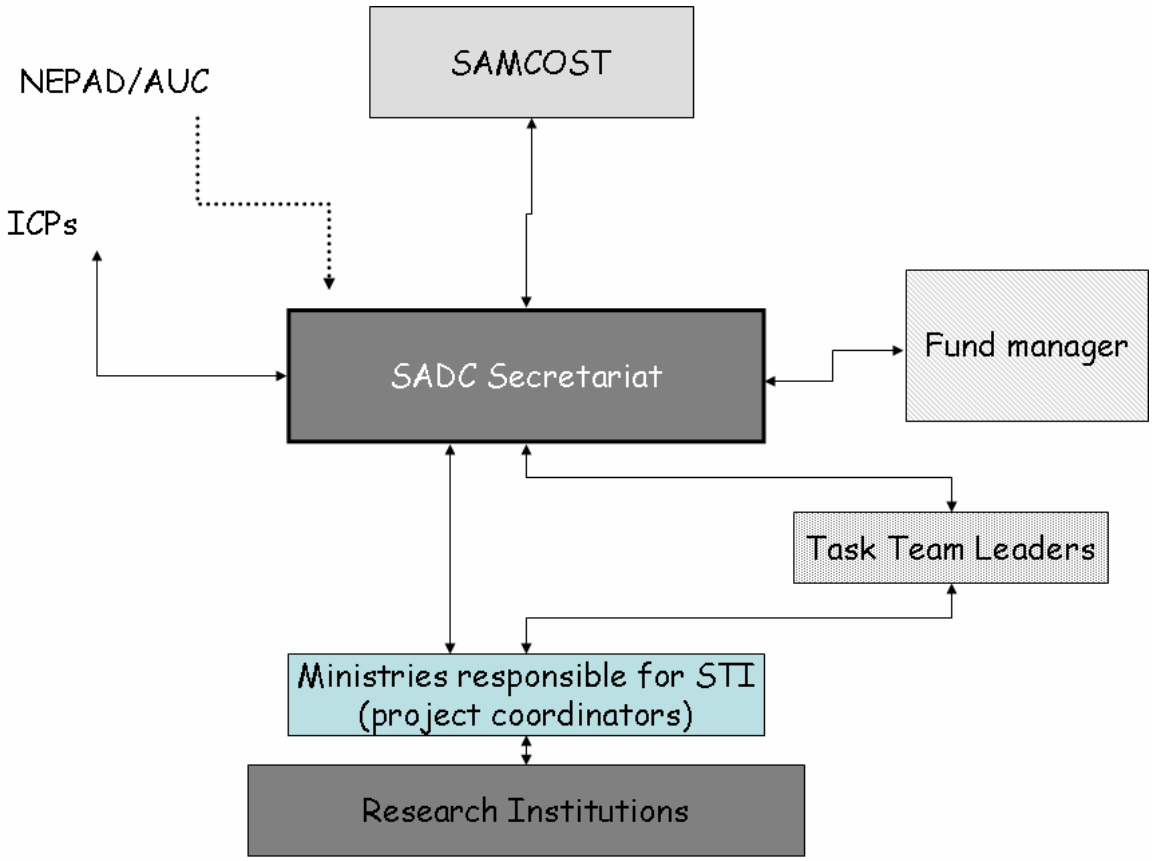
	4.5.3	Human capacity – with emphasis on attracting young scientists	4.5.3.1 4.5.3.2	Audit of existing capacity in region (linked to existing processes); including a gap analysis; Develop HCD programme developed for the region linked to STI interventions programmed here; and also to existing initiatives (such as START-PACOM; and the OSI climate change education in universities programme). Associated monitoring and evaluation process.
Research Infrastructure	4.5.4	Appropriate infrastructure – facilities, ICT	4.5.4.1 4.5.4.2	Audit of existing infrastructure and facilities; including a gap analysis; Development of a SADC research infrastructure plan, based on gap analysis.
Technology Transfer	4.5.5	Facilitate technology transfer in the region	4.5.5.1 4.5.5.2	Undertake a technology needs assessment; Development of a SADC technology transfer plan (with further elaboration); linked to the framework programme; based on gap analysis.
Resources (financial and technical)	4.5.6	Leverage funding, incentives & technical support for the implementation of identified interventions	4.5.6.1 4.5.6.2	Specific financial assistance and modalities; Specific technical assistance from specific countries/development partners for specific project portfolios to start the process.

5. Means of implementation

5.1 Institutional arrangements

As shown in Figure 1, each SADC member state takes responsibility for an area of particular interest/capacity (e.g. selected STI interventions – see above, referenced by number). A development partner then contracts with the country; and runs the monitoring and evaluation process. Each country has a project coordinator within the Ministry of Science and Technology reporting back to the Ministry and to the SADC Secretariat. SADC Secretariat thus reports back to SAMCOST.

Figure 1: Suggested institutional implementation process



At the SADC Secretariat itself, a focal point, in the form of the S&T desk, also runs a monitoring and evaluation process for the entire programme (with occasional M&E technical support, when required).

NEPAD Planning and Coordination Agency (NPCA) to provide technical support to member states; and further assistance in leveraging resources to support projects and programmes.

Process for selection of projects – use the implementation framework to guide the drafting of the terms of references; as well as the consortium of countries to participate in the project(s)/project portfolios. The implementation process remains cognizant of the different stages of scientific development of different states within SADC.

5.2 Resources

A harmonized pool of funding is coordinated by the SADC Secretariat, with the assistance of an appointed regional fund manager (for example, based at development finance institutions; including an independent audit process), used by the Secretariat to disburse funds (without parallel project implementation units). The Monitoring and Evaluation programme below administered by the same.

Technical support and resources are coordinated and disbursed by the SADC Secretariat in response to project cluster stated needs (4.5.6). NEPAD/AUC and other relevant international organizations will provide further support in this regard. Research infrastructure, institutional capacity and skills requirements are further stated in project cluster plans; and thus coordinated in response.

6. Monitoring and evaluation

Overall oversight is provided by SAMCOST (see Figure 1); where annual reports are provided by the SADC Secretariat on the overall programme M&E process. At the SADC secretariat, the focal point both overseas the project cluster monitoring and evaluation process; and runs a monitoring and evaluation process for the entire programme, developed by an M&E expert. M&E processes include the abovementioned independent audit process; and will be budgeted for within the framework and project cluster budgets.

7. Conclusion

The development of a SADC STI Implementation Framework to support CC Responses in the region is unique , in that it is truly regionally and participatory driven , significantly by country identified needs and priorities and remains a dynamic process open for regular reviews and updates. Deriving from the SAMCOST mandate and its governance structure (Figure 1), the framework's major outcomes include strengthened institutional capacities, policy development, skills development as well as sector based R&D infrastructure to effectively respond to climate change challenges. In addition, this initiative provides the basis for coordinated leveraging of adequate financial resources to effectively implement the SADC STI Implementation Framework to support CC Responses. Finally, it is envisaged that this framework could also be applied to other key socio-economic sectors such as agriculture and health, among others.

References

To be finalized