

Twelfth meeting of the Technology Executive Committee

United Nations Campus (AHH building), Bonn, Germany
5-8 April 2016

Background paper on the implementation of technology action plans of developing countries

Cover note

I. Background

1. The purpose of this background paper is to deliver an in depth overview of key findings from more than three hundred technology action plans (TAPs) conducted and reported by developing countries as part of their technology needs assessment (TNA) reports. By reading this paper, stakeholders will be:

- (a) Made aware of the substance of the TAPs, including:
 - (i) Mitigation and adaptation sectors and sub-sectors;
 - (ii) Actions identified in TAPs;
 - (iii) Common elements of TAPs;
- (b) Provided with an understanding of implementation priorities of developing countries on regional and global scales;
- (c) Driven through the TAPs as opportunities to:
 - (i) Discuss them as possible investment portfolio;
 - (ii) Consider their possible further development via feasibility and other studies;
 - (iii) Capitalize on in form of their further promotion;
 - (iv) Make other mitigation and adaptation communities (INDCs, NAPs etc.) aware of the added value that the TAPs can provide in terms of nationally identified actions.

2. Finally, this paper will allow stakeholders to better understand important elements of TAPs, in a way to deliver options with a strong potential of implementation to their countries, to enhance action on the development and transfer of technologies, to support enhanced action on climate change.

3. The information provided were in details distilled from the TAPs and analysed in order to simplify reading and to provide a comparable overviews of each region, highlight similarities and main differences between regions. The analyses were undertaken also in order to recognize the current implementation potential of TAPs, to highlight similarities and differences of TAPs on regional level also from an investment point of view. This was done to allow possible investors to consider how much further effort needs to be done to make TAPs fundable.

II. Scope of the paper

4. This background paper provides an in depth overview of TAPs conducted and reported by developing countries as part of their TNA reports.



III. Expected action by the Technology Executive Committee

5. The TEC will be invited to consider the background paper on implementation of TAPs of developing countries as an informative input to the guidance on TAPs in order to finalize the guidance and disseminate it to developing countries shortly.

Annex

Implementation of Technology Action Plans of developing countries

1. Introduction

The purpose of this paper is to deliver an in depth overview of key findings from more than three hundred technology action plans conducted and reported by developing countries as part of their technology needs assessment reports. By reading this paper, stakeholders will be:

- Made aware of the substance of the technology action plans including:
 - Mitigation and adaptation sectors and subsectors,
 - Actions identified in TAPs,
 - Common elements of TAPs.
- Provided an understanding of implementation priorities of developing countries on regional and global scales.
- Driven through the technology action plans as opportunities to:
 - Discuss them as possible investment portfolio,
 - Consider their possible further development via feasibility and other studies,
 - Capitalize on in form of their further promotion,
 - Make other mitigation and adaptation communities (INDCs, NAPs etc.) aware of the added value the TAPs can provide in terms of nationally identified actions.

Finally, this paper will allow stakeholders to better understand important elements of technology action plans, in a way to deliver options with a strong potential of implementation to their countries, to enhance action on the development and transfer of technologies, to support enhanced action on climate change.

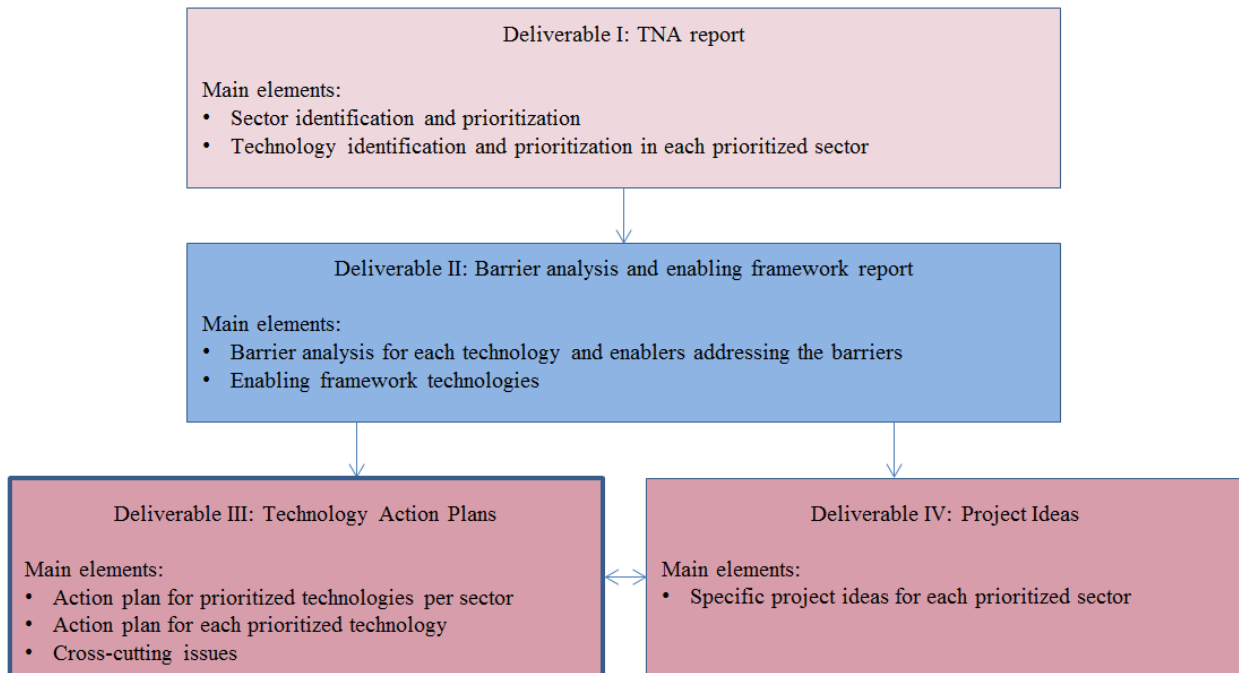
The information provided were in details distilled from the TAPs and analyzed in order to simplify reading and to provide a comparable overviews of each region, highlight similarities and main differences between regions. The analyses were undertaken also in order to recognize the current implementation potential of TAPs, to highlight similarities and differences of TAPs on regional level also from an investment point of view. This was done to allow possible investors to consider how much further effort needs to be done to make TAPs fundable.

2. Technology action plans as part of technology needs assessment process

The Technology needs assessment is a country driven process where developing countries identify and prioritize their technology priorities for mitigation greenhouse gases and adapting to the adverse effects of climate change. Since 1999 almost 90 developing countries have undertaken TNAs.

Countries prepared their TNAs in a manner that was consistent with the methodology consisting from a Handbook for conducting TNA for climate change, a Guidebook on Overcoming barriers to transfer and diffusion of climate technologies, UNFCCC Guidebook on preparing and presenting technology transfer projects for financing, UDP Guidebooks on accessing international financing for climate change mitigation and adaptation, and TAP report template for mitigation and adaptation. The majority of TNA reports included separate reports for each step of the TAN process, including TNA, barrier analysis, and enabling framework, TAP and project ideas reports. Figure 1 shows the four deliverable of the TNA process. In the Phase II of the TNA project, the TAP and Project ideas deliverables were merged and are both contained in the TAP deliverable, including large and small scale actions.

Figure 1. Deliverables of the TNA process



As indicated above, the TNAs are capable of yielding a variety of outputs, including clarification of technology barriers, strategies, policies, and options that a country could implement to reduce GHG emissions and enhance the ability to adapt to climate change. Their ultimate purpose is to identify and exploit the national and international opportunities for technology transfer. The major outcomes may include national policy development, mitigation and adaptation technology assessments, a specific technology transfer project formulations, and networks amongst key national and regional technology stakeholders.

2.1 What are the TAPs?

The Technology Action Plans (TAPs) are a group of actions for addressing barriers and accelerating the development and transfer of prioritized technologies. The nationally identified TAPs recommend enabling frameworks to address identified barriers to the development and transfer of prioritized technologies, and to build on identified enablers and turn them into actions.

TAPs are concise plans for development, transfer, deployment and diffusion of priority technologies within a country at a scale that is desired for contributing to the country's social, environmental and economic development and to climate change mitigation and adaptation.

2.2 Elements of the TAP process at the national level

1. During the latest round of TNAs (2009-2013), 29 countries have together developed 328 TAPs, of which 142 for mitigation and 186 for adaptation.
2. All TAPs were based on the technology prioritization in the TNA process, all TAPs were driven by demand based on country priorities, as revisited by domestic stakeholders, and all TAPs followed on the analysis of market barriers and enablers.
3. Most of the TAPs are identified at larger scale of technology development and transfer. Their scope is usually broader than that of single projects, although single projects are also included among actions identified in TAPs.
4. A vast majority of TAPs aimed at deployment and diffusion of priority technologies at a larger scale within countries, while some of the TAPs were designed to prepare for an implementation of a single project.
5. Most of TAPs included a cost indication per action plan and per each activity included in the action plan, including indication of potential domestic and international funding sources.

6. Almost all TAPs contain capacity building, including information and awareness campaigns, trainings to enhance: technical capacity, technology operation and maintenance, data collection and organization.
7. TAPs indicated roles of various stakeholders in the process of their implementation, including which actors will be involved for each of the activities.
8. Most of the TAPs included indicators for monitoring the implementation of action plan.

3. Mitigation and adaptation sectors identified and prioritized in TAPs

3.1 Africa

As seen in figure 2 almost all African countries from the Phase I of the global TNA project prepared their mitigation technology action plans (34) in energy sector. Other prioritized sectors included waste management, agriculture and transport. Figure 3 shows that water and agriculture sectors were prioritized by majority of African countries for their adaptation technology action plans (33 and 32 respectively). These sectors were followed by coastal zones sector.

Figure 2
Mitigation sectors

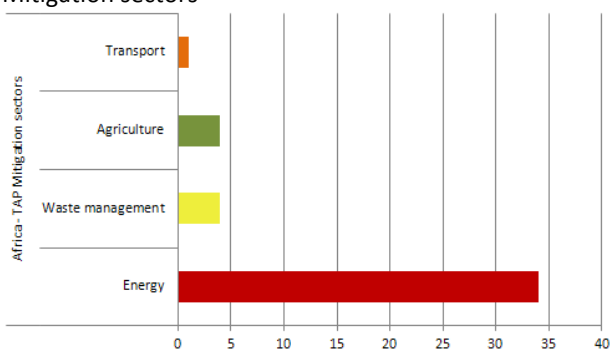
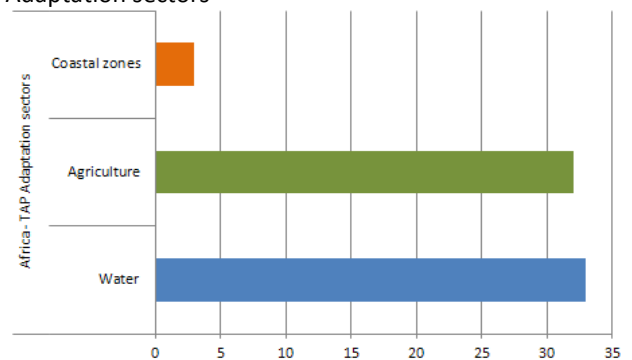


Figure 3
Adaptation sectors



3.2 Asia

In Asian countries energy sector was prioritized by most of them for mitigation technology action plans (30). Other prioritized sectors were transport, forestry and peat and agriculture. This is shown in Figure 4. As shown in figure 5, agriculture and water were two most prioritized adaptation sectors for technology action plans (23 each), followed by coastal zones, food security and health sectors.

Figure 4
Mitigation sectors

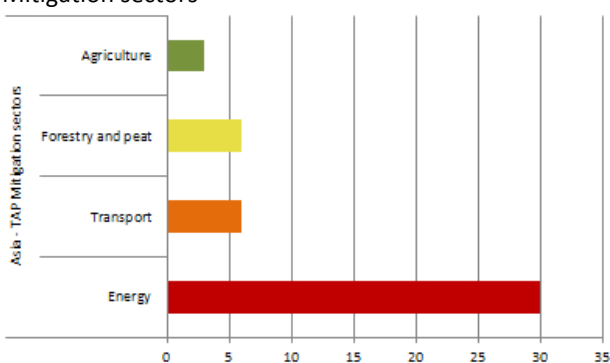
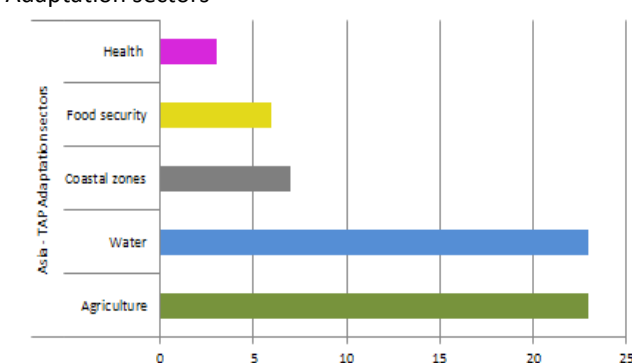


Figure 5
Adaptation sectors



3.3 Latin America

As seen in figure 6, energy sector was mostly prioritized by Latin American countries for their mitigation technology action plans (15). This was followed by transport, waste management and agriculture sectors. Adaptation technology action plans (16) of Latin American countries included mostly water sector, followed by agriculture (8), climate observation and health sectors. This is shown in figure 7.

Figure 6
Mitigation sectors

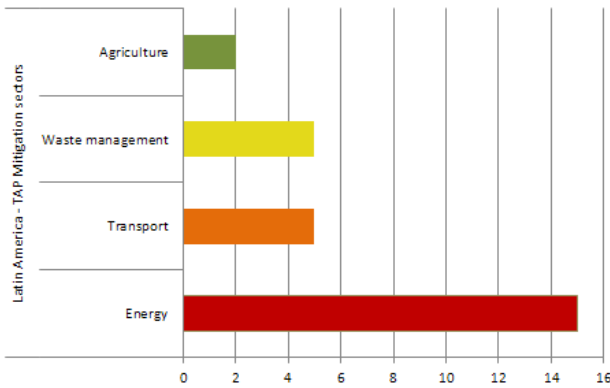
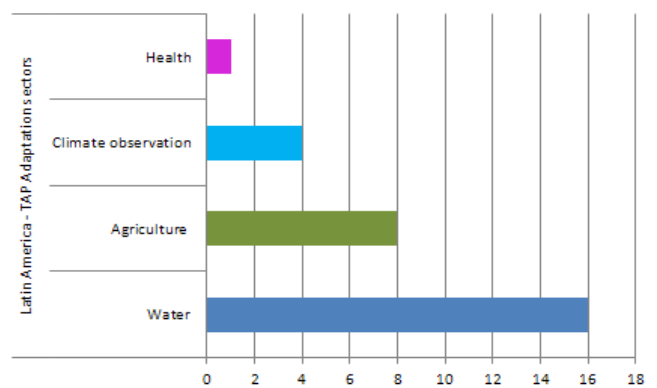


Figure 7
Adaptation sectors



3.4 Comparative regional analysis

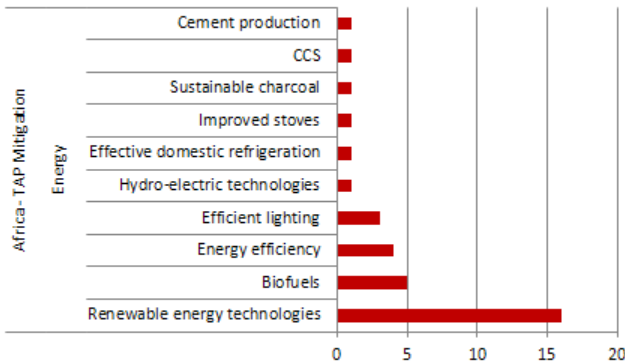
Energy was the dominant sector for mitigation technology action plans in all regions. In total almost 80 technology action plans were produced by developing countries in energy sector. In mitigation sector technology action plans were conducted in each region in transport and agriculture sectors. Waste management was prioritized in Africa and Latin America regions. In all regions more than 70 adaptation technology action plans were conducted in water sector and more than 60 in agricultural sector. Technology action plans including coastal zones sector were conducted in Africa and Asia. Other sector where technology action plans were produced was health sector in Asia and Latin America.

4. Prioritized mitigation and adaptation subsectors in TAPs

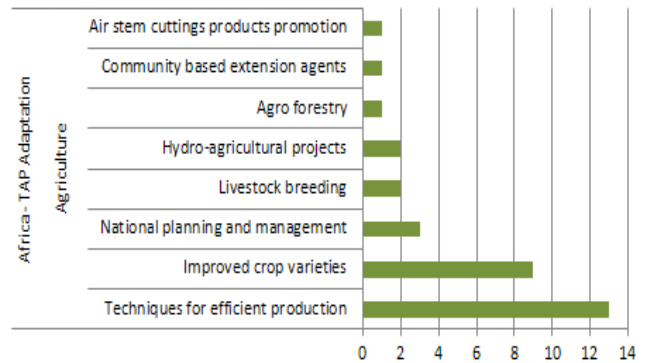
4.1 Africa

From 34 African TAPs in energy sector about one third was prepared in renewable energy sub-sector, followed by biofuels and energy efficiency sub-sectors. In adaption water collection and harvesting, and water supply were dominant water sub-sectors followed by drip irrigation. Technologies for efficient production and improved crop varieties were two dominant subsectors for TAPs in agricultural sector. This is shown in figure 8 below.

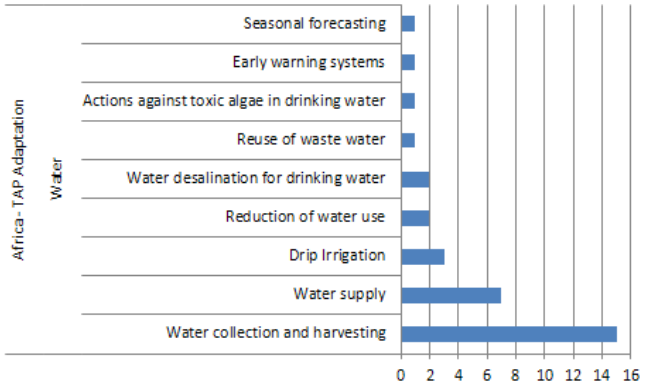
Figure 8
Mitigation sub-sectors
Energy



Adaptation sub-sectors
Agriculture



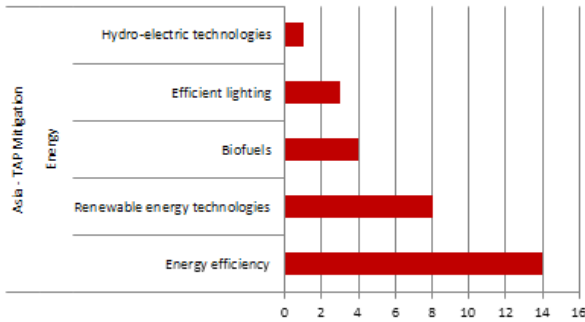
Water



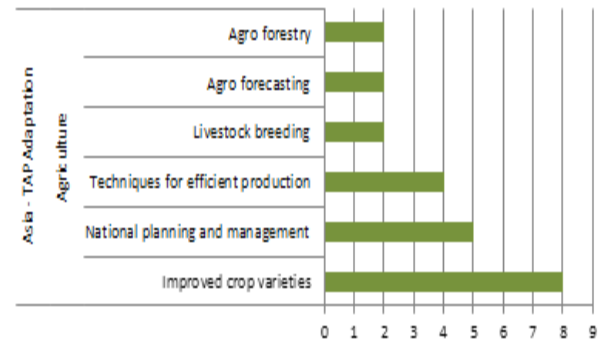
4.2 Asia

As shown in figure 9 From 30 Asian technology action plans almost half were reported in energy efficiency sub-sector, followed by renewable energy technologies. In adaptation water collection and harvesting, water supply and seasonal forecasting were most dominant sub-sector for TAPs in the water sector, while for the agricultural sector countries focused mostly on improved crop varieties, national planning and management and techniques for efficient production sub-sectors.

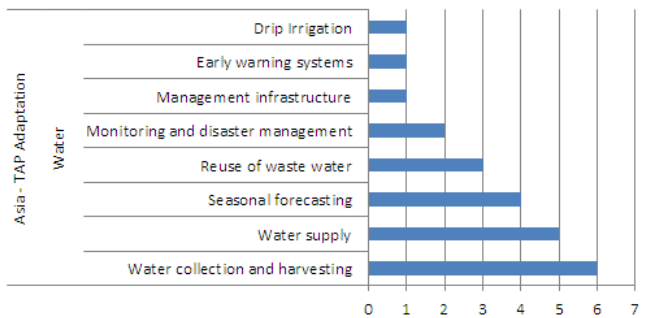
Figure 9
Mitigation sub-sectors
Energy



Adaptation sub-sectors
Agriculture



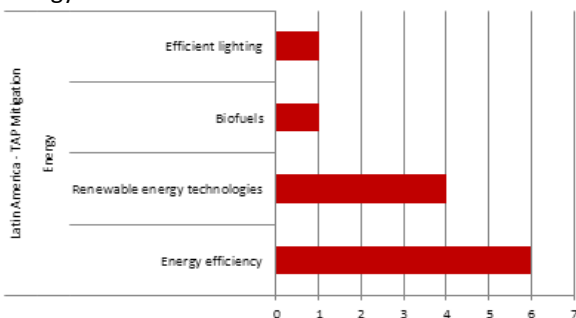
Water



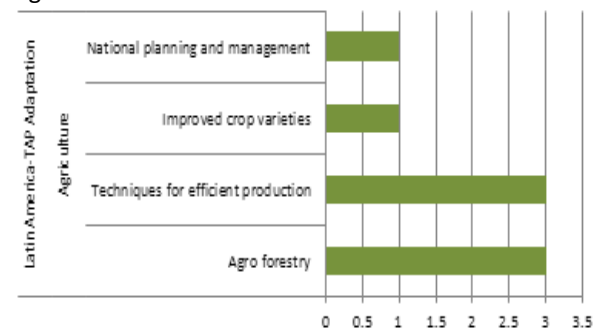
4.3 Latin America

Figure 10 shows that two third of TAPs in energy sector were reported in energy efficiency and renewable energy technologies sub-sectors. In water sector countries identified drip irrigation and water supply as main TAP subsectors. In agriculture focus was given to agro forestry and techniques for efficient production sub-sectors.

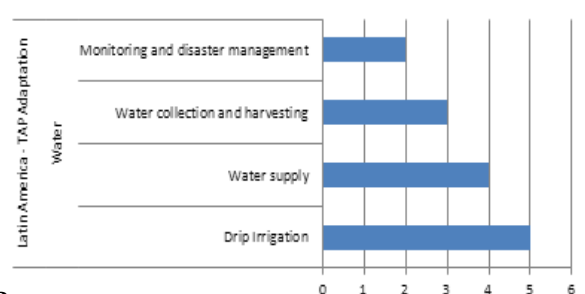
Figure 10
Mitigation sub-sectors
Energy



Adaptation sub-sectors
Agriculture



Water



4.4 Comparative regional analysis

Mitigation sectors and subsectors of TAPs were quite similar in each region, and differences were minor. Energy efficiency TAPs were dominantly prepared in Asia and Latin America and together with Africa 24 TAPs were prepared in energy efficiency sub-sector. In total 28 renewable energy technologies TAPs were conducted in all the three regions, making this sub-sector the most dominant in total prepared TAPs. Energy efficiency and renewable sub-sectors were followed by biofuels subsector in which 10 TAPs were prepared by countries. Examples of energy efficiency and renewable energy sub-sectors identified by countries are provided in the Box 1.

Box 1.

For energy efficiency following sub-sectors were identified:

Morocco - National programme supporting energy efficiency technologies in housing;

Zambia, Bhutan - Policy on energy efficiency;

Senegal - Energy efficiency programme in industry;

Mongolia - Development and adoption of energy efficiency law;

Dominican Republic - Energy efficiency in public buildings;

Colombia - Energy efficient regeneration burners.

For renewable energy the following sub-sectors were identified:

Rwanda - Set up a unit for training and research of solar exploitation;

Senegal - Development of law to foster renewable energy production, mapping of potential;

Indonesia - Development of national PV cells industry, improvement of local research and development;

Mongolia - Introduction of feed-in tariff for medium and large scale hydro power plans;

Sri Lanka - Imposing levy for fossil fuels, constitute fund for renewable energy projects;

Vietnam - Development of wind maps;

Argentina, Dominican republic - Enhanced implementation of biomass for energy production.

In adaptation, water collection and harvesting was dominant sub-sector for TAPs in water sector in which 24 TAPs were conducted. It was followed by water supply with 16 TAPs and drip irrigation with 9 TAPs. This makes water sector sub-sectors quite similar in each of the three regions with marginal differences only. In agriculture sector techniques for efficient crop production were identified by majority of countries which conducted 20 TAPs in this sub-sector. It was followed by improved crop varieties sub-sector with 18 TAPs and national planning and management sub-sector with 8 TAPs. Examples of water collection and harvesting, and crop production sub-sectors are provided in the Box 2.

Box 2.

For water collection and harvesting the following sub-sectors were identified:

Dominican Republic, Peru - Exploring of innovative rain harvesting methods;

Cambodia - Implementation of small dams, reservoirs, micro catchments;

Sri Lanka - Restoration of networks of small dams, reservoirs, micro catchments;

Kenya, Zambia - Surface water harvesting technology;

Senegal - Reuse of waste water for households usage.

For efficient crop production the following sub-sectors were identified:

Sudan - Improved crop varieties breeding;

Cote d'Ivoire - Multiplication of food plants tolerant to water stress;

Senegal – Development of bank of improved seeds;

Bangladesh – Implementation of improved farming processes for food crops;

Mongolia – Wheat production intensification;

Bhutan – Implementation of drought and pest resistant crops production;

Thailand – Crop improvement technologies development and deployment.

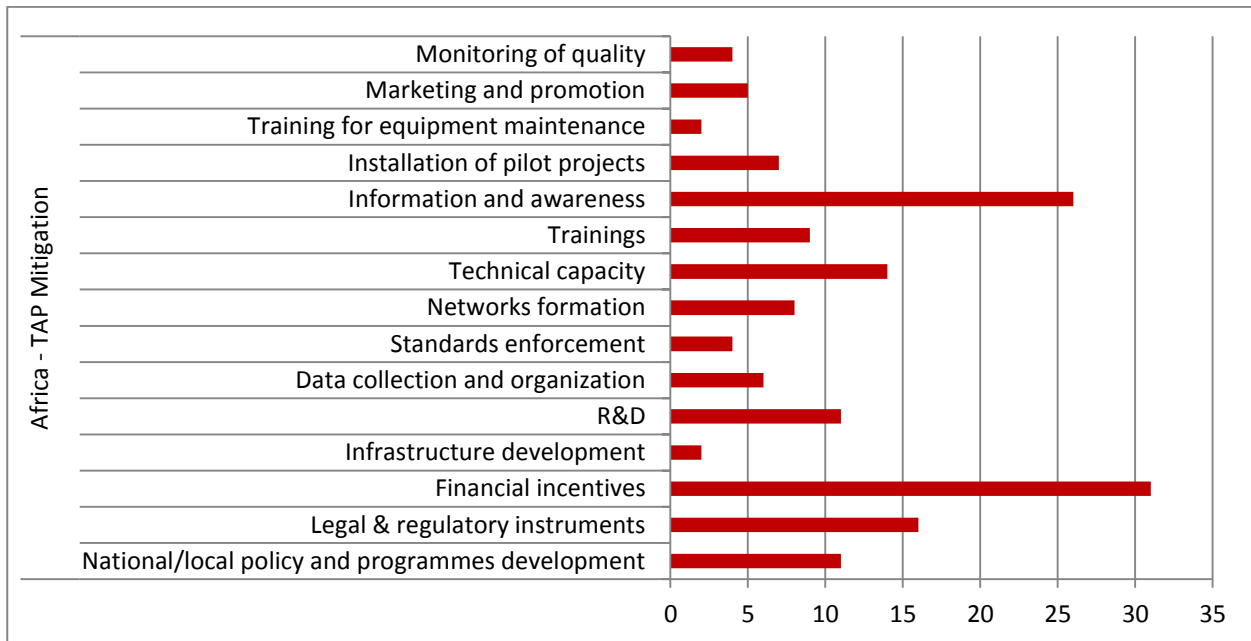
5. Actions identified in TAPs

A thorough analysis of action plans allowed following multiple actions proposed by countries, as a logical follow up of their work on barriers and enablers. During the analysis these actions were categorized based on quantity of their identifications by countries and are presented below in six figures, two per each region representing mitigation and adaptation actions. Actions which were identified less than two times are not presented in the figures.

5.1 Africa

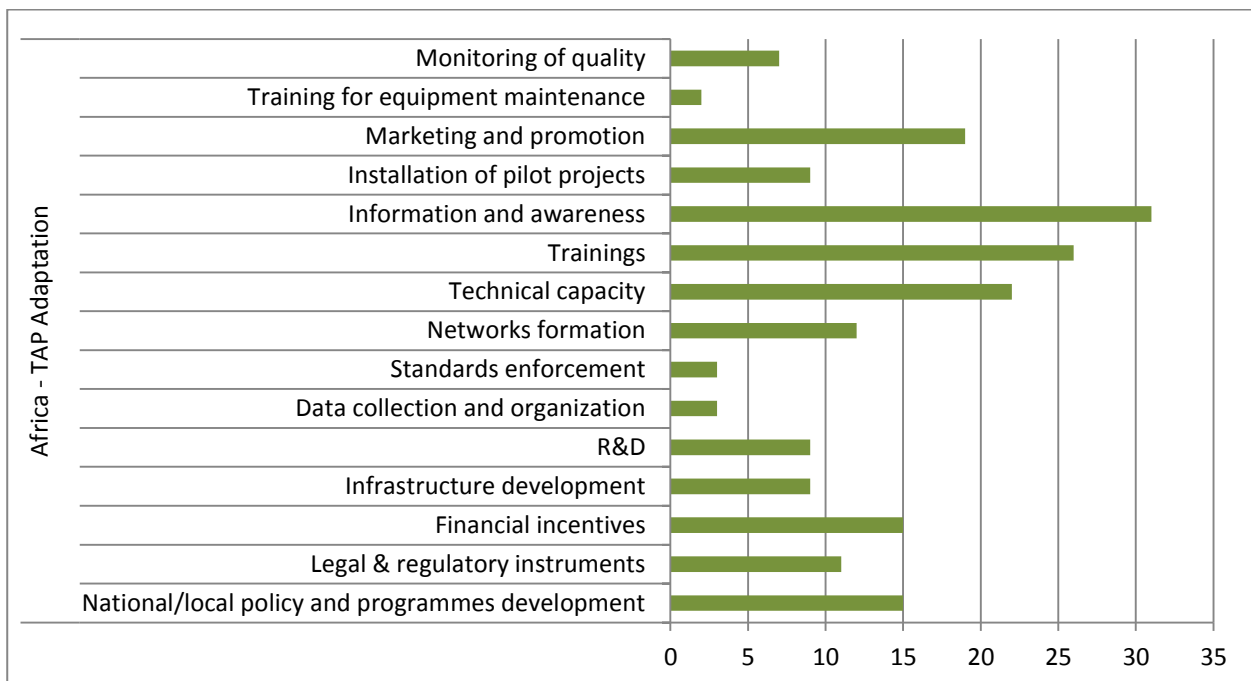
As seen in the figure 11 actions to create enabling conditions for technologies for mitigation prioritized by African countries to be undertaken in action plans were: implementation of financial incentives for implementation of an action, information and awareness mainly to assist with familiarization with identified technologies, and development of legal and regulatory instruments to create a sound enabling environment for identified technologies.

Figure 11
Actions identified in mitigation TAPs



As seen in the figure 12 actions prioritized by African countries to be undertaken in adaptation action plans were: information and awareness, trainings, and development of technical capacity to develop, deploy, disseminate, operate and maintain adaptation technologies.

Figure 12
Actions identified in adaptation TAPs

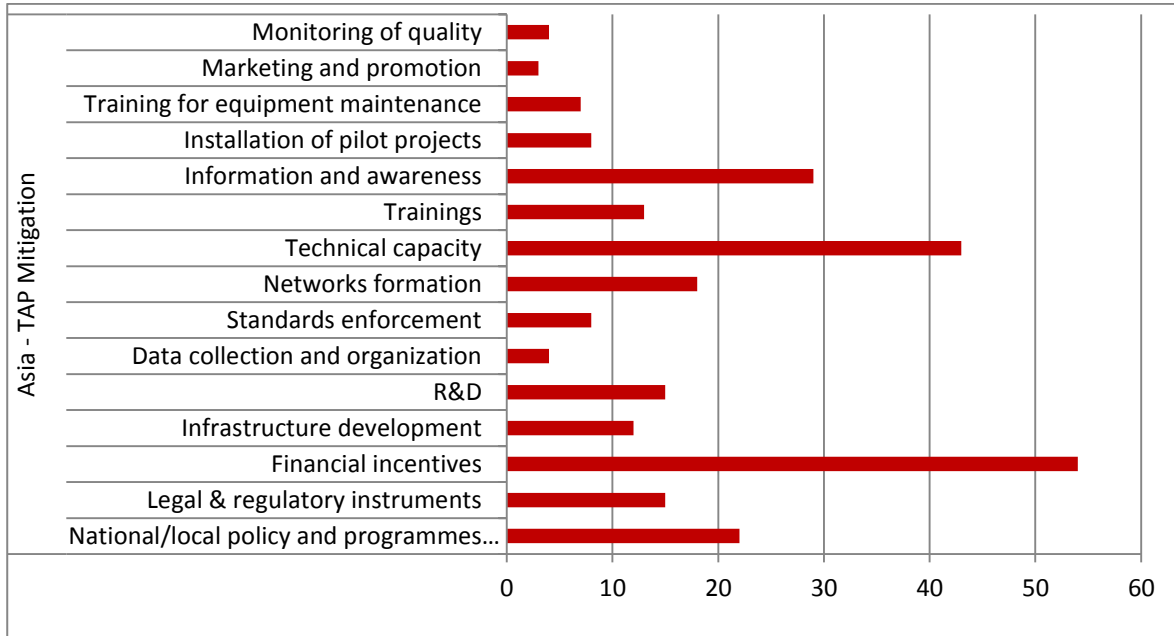


5.2 Asia

Financial incentives, technical capacity and information and awareness were mostly identified actions in mitigation TAPs of Asian countries. This is shown in the figure 13.

Figure13

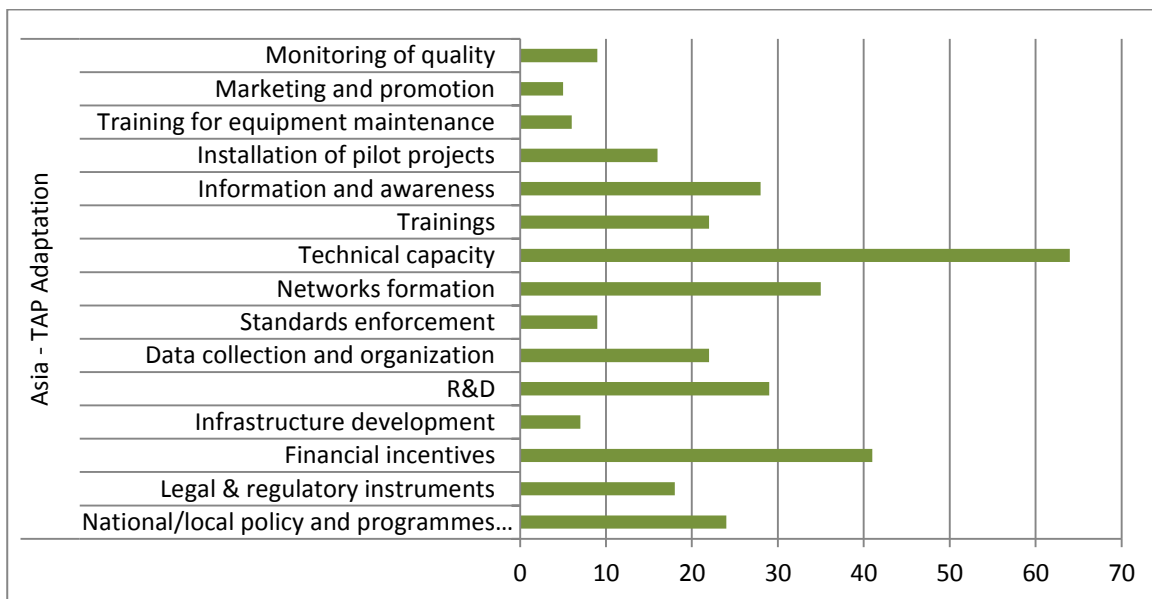
Actions identified in mitigation TAPs



As seen in the figure 14 technical capacity, financial incentives and network formation were mostly identified activities in adaptation TAPs of Asian countries.

Figure 14

Actions identified in adaptation TAPs

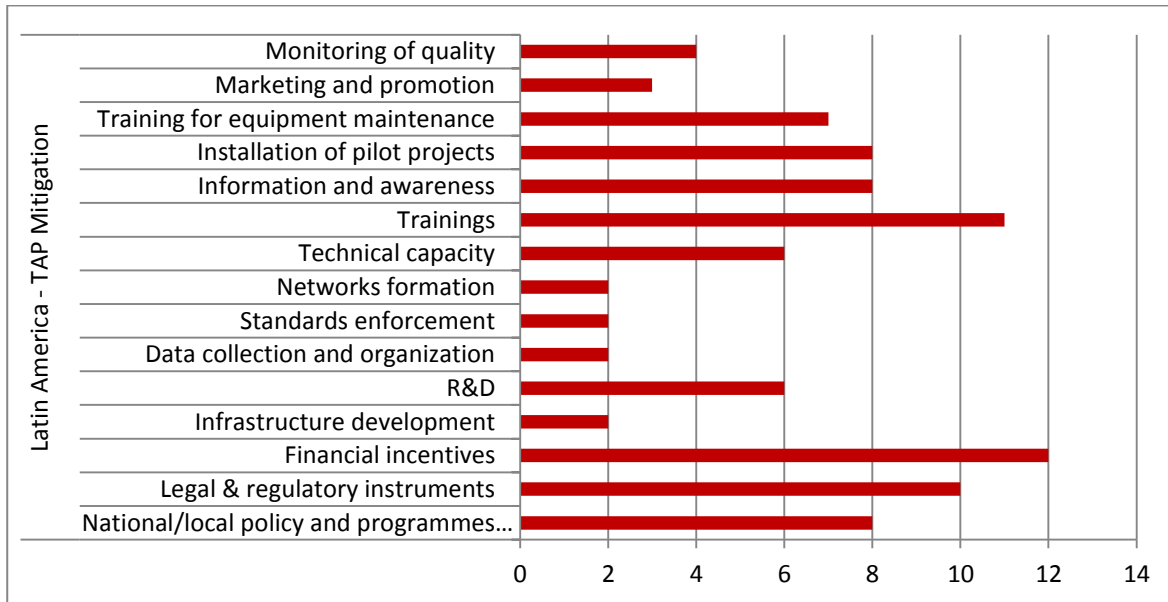


5.3 Latin America

As seen in the figure 15 implementation of financial incentives to support technologies, organization of trainings, and development and employment of legal and regulatory instruments were mostly identified mitigation actions by countries in Latin American region.

Figure 15

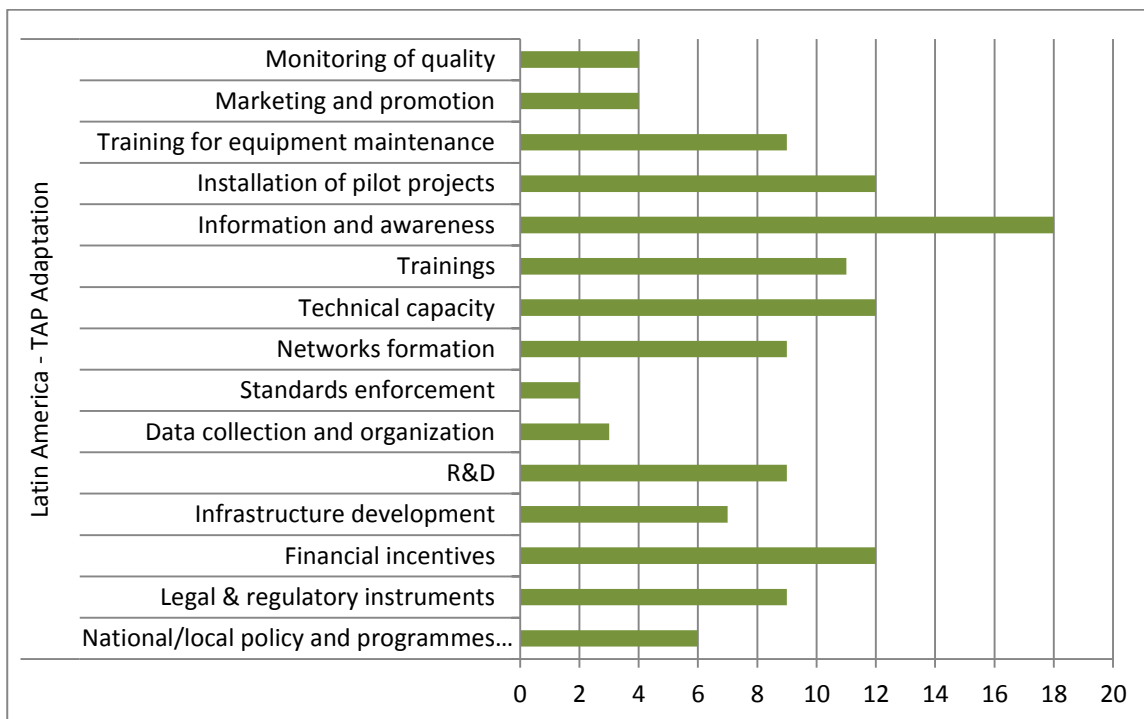
Actions identified in mitigation TAPs



As seen in the figure 16 information and awareness was dominantly identified actions in adaptation action plans of countries in Latin America. This was followed by pilot projects installation, technical capacity development, and implementation of financial incentives.

Figure16

Actions identified in adaptation TAPs



5.4 Comparative regional analysis

In mitigation, most types of actions were financial incentives, which were reported frequently in all three regions, followed by information and awareness and development of technical capacity. Legal and regulatory instruments were also quite frequently reported by countries in Africa and Latin America. In adaptation, countries in all three regions identified development of technical capacities to develop, deploy, disseminate, operate and maintain adaptation technologies, followed by financial incentives mainly reported by Asian countries, and information and awareness and trainings to enhance human capacities mainly reported by African countries. Examples of actions which were considered by countries in a need for financial incentives are provided in the Box 3.

Box 3.
Examples of actions in which need for financial incentives were identified:
 Kenya - Solar home systems;
 Zambia - Geothermal energy for electricity generation;
 Cote D'Ivoire - Landfill biogas capture;
 Bhutan - Drip and sprinkler irrigation systems;
 Vietnam – Wind power technology, combined production of heat and power;.

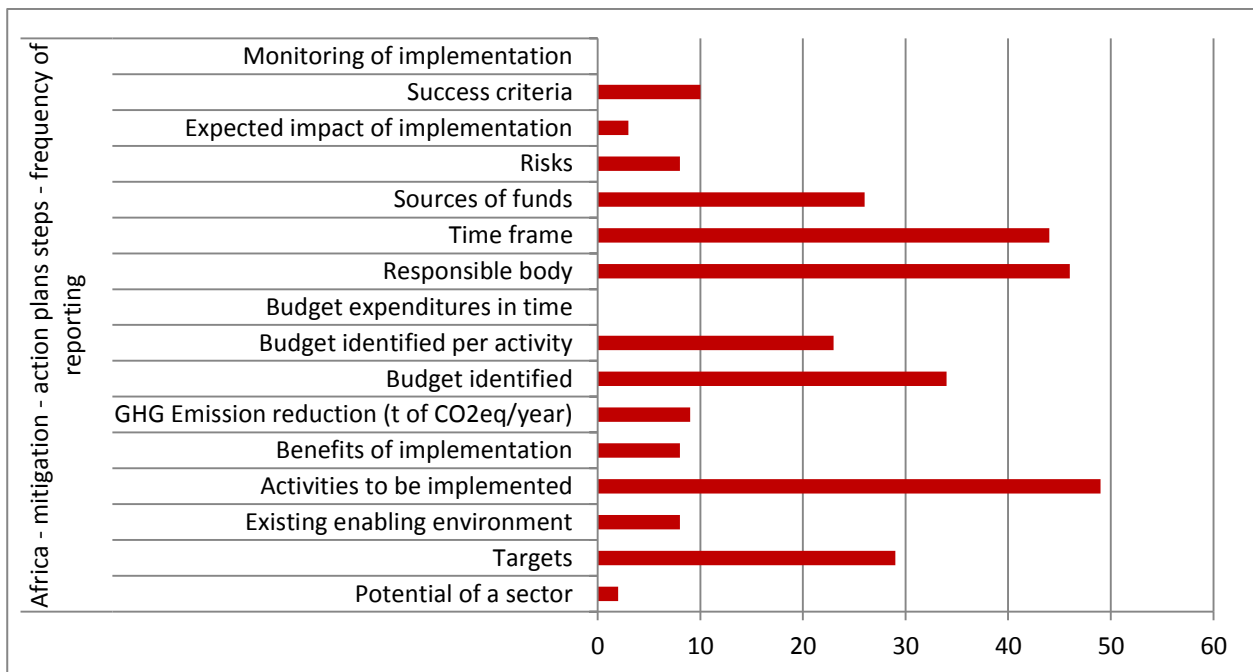
6. Common elements of TAPs

Several examples of action plans were reviewed of multinational institutions, governments, private sector and non-governmental institutions to distill their common elements, and compare these with the elements of TAPs conducted in the TNA process. The following analysis shows the level of coverage of these common elements in the TAPs.

6.1 Africa

As seen in the figure 17, the coverage of elements: activities to be implemented, responsible organization and time frame, identified budget and sources of funding, was the densest in the African TAPs. Only a few mitigation TAPs of African countries covered elements on identification of budget expenditures in time, monitoring of implementation of proposed action plan, potential of the sector in which the action plan is proposed and expected impact of implementation.

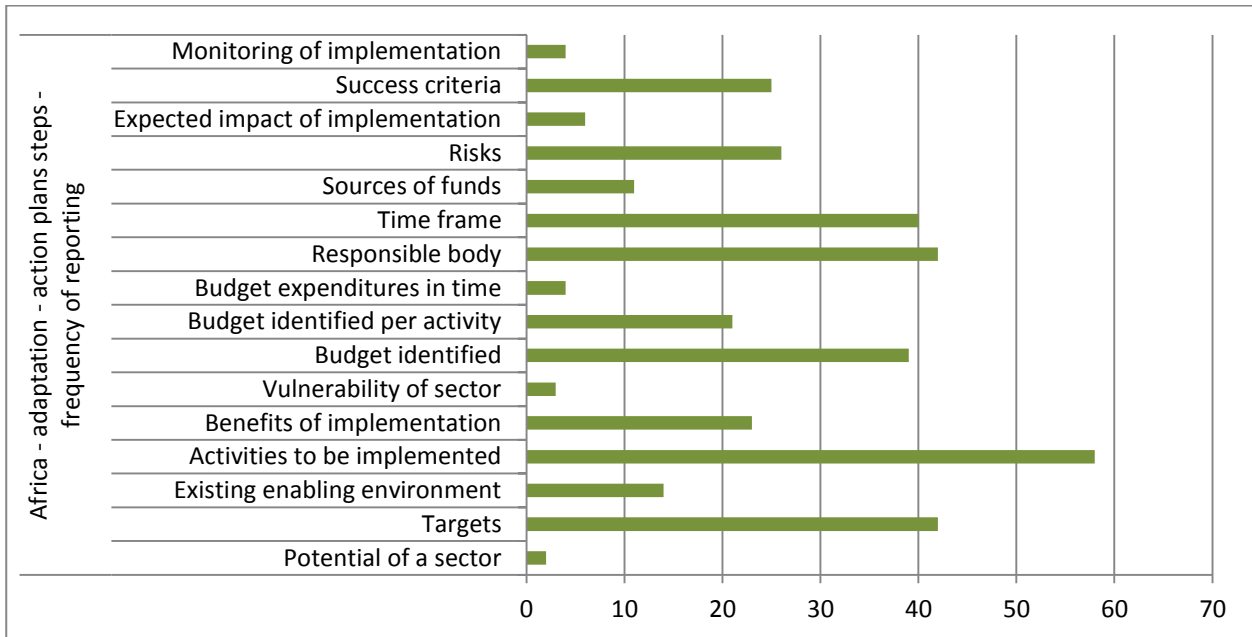
Figure17
 Common elements of action plans in mitigation TAPs



As seen in the figure 18, coverage of elements: activities to be implemented, responsible organization and targets to be reached when implementing the action plan, was very dense by the TAPs of African countries. Other identified elements were time frame of, and budget for, the action plan. On the other side the elements not very frequently

identified by African countries were: definition of a potential of a sector, vulnerability of the sector, budget expenditures in time and monitoring of implementation.

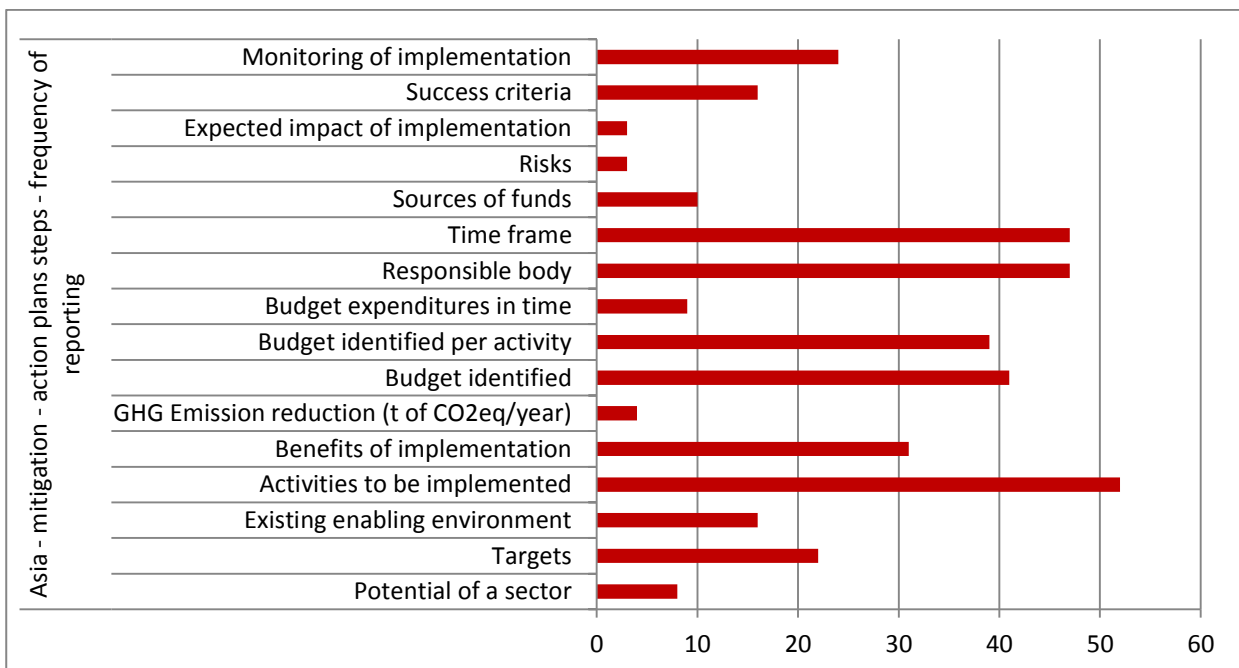
Figure 18
Common elements of action plans in adaptation TAPs



6.2 Asia

As seen in the figure 19, elements: activities to be implemented, responsible organization and time frame were very frequently identified in the TAPs of Asian countries. Also frequently identified elements were budget and budget identified per activity. The mitigation TAPs of Asian countries lacked several important elements such as risks connected with implementation of action plan, and expected impact of implementation.

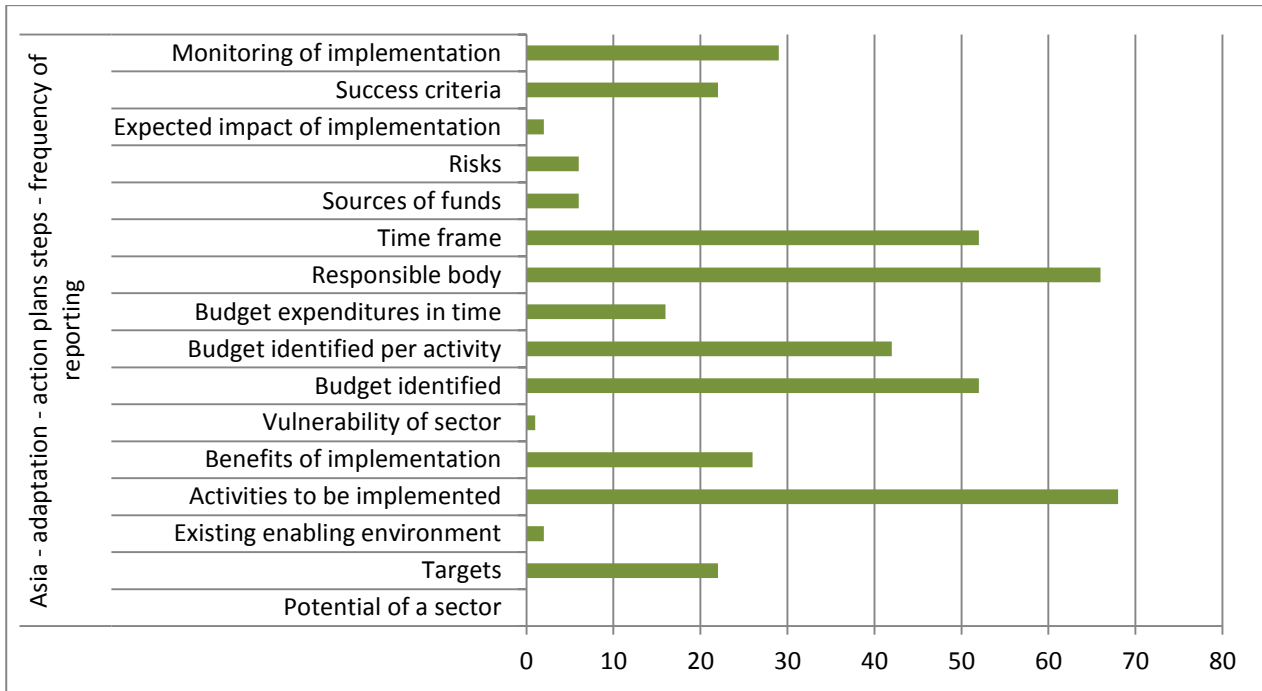
Figure 19
Common elements of action plans in mitigation TAPs



As seen in the figure 20, elements: activities to be implemented, responsible organization and time frame for implementation of action plan were frequently identified in the Taps of Asian countries. Other frequently identified

elements were identified budget, and budget identified per activity. The adaptation TAPs of Asian countries lacked the following common elements of action plans: definition of a potential of a sector, characterization of existing environment, vulnerability of sector, and expected impact of implementation.

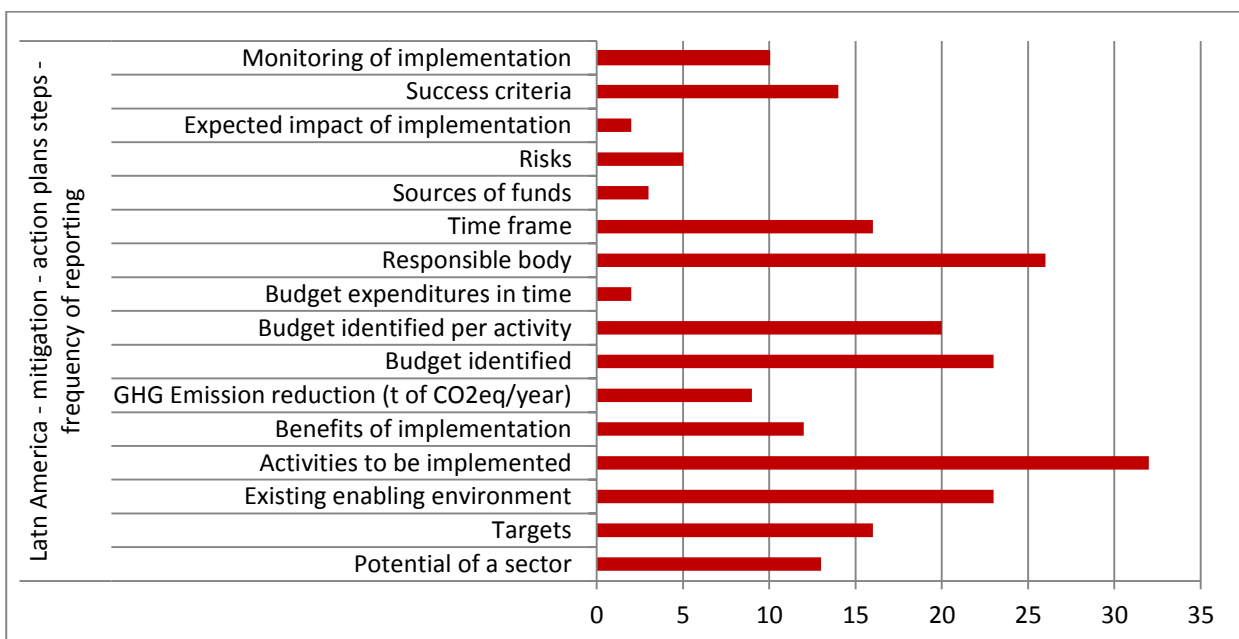
Figure 20
Common elements of action plans in adaptation TAPs



6.3 Latin America

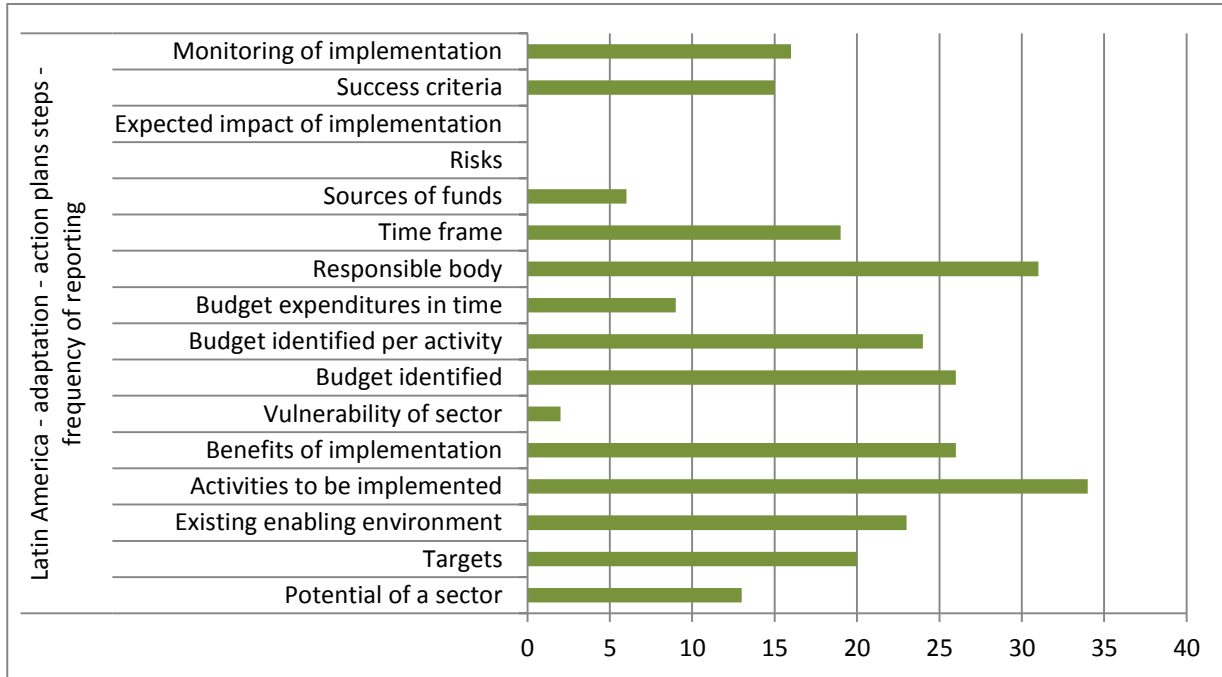
As seen in the figure 21, most of Latin American countries frequently included in their mitigation TAPs the following common elements of action plans: activities to be implemented, responsible organization and identified budget. Other frequently identified elements were enabling environment and budget identified per activity. The elements very rarely identified in the he mitigation TAPs of Latin American countries were expected impact of implementation, sources of funds, and budget expenditures in time.

Figure 21
Common elements of action plans in mitigation TAPs



As seen in the figure 22, the elements frequently reported in the adaptation TAPs of Latin American countries were: activities to be implemented, responsible organization, identified budget, and benefits of the implementation. Other frequently identified elements were identified budget per activity and existing enabling environment. The adaptation TAPs of Latin American countries lacked the following elements: expected impact of implementation, identification of risks, and vulnerability of sector.

Figure 22
Common elements of action plans in adaptation TAPs



6.4 Comparative regional analysis

In mitigation following elements of action plans were reported most frequently in all three regions: activities to be implemented, responsible body and time frame of action plans. These were followed in each three regions by budget identified per action plan and budget identified per each activity of action plan. In adaptation following elements of action plans were reported most frequently in all three regions: activities to be implemented, responsible body, and budget identified per action plan. These were followed by time frame of action plans, and budget identified per ach activity of action plan. Examples of action plans identified by countries are provided in the Box 4.

Box 4.

Examples of action plans identified by developing countries:

S.No	Measure	Why is it important?	Who should do it?	How should they do it?	Time-scale	Monitoring, reporting and verification for measure	Indicators of Success	Budget (000' USD)
1.	Rationalize the budget for farm road development in accordance with the technical standards for climate-resilience	Inadequate budget compromises the implementation of recommended technical standards, which in turn leads to poor quality of roads and consequently higher costs of maintenance and restoration	DoA/MoAF, MoF, GNHC	<ul style="list-style-type: none"> ↳ Review existing costs and budget for farm road development in relation to the recommended technical standards for farm roads, including those required for climate-resilience, and come up with specific recommendations; ↳ Convene inter-agency meetings/ workshops to discuss the review findings and implementation of recommendations; ↳ Produce and disseminate farm road budgeting guidelines for implementation together with the technical standards. 	2013-2014	MoAF, MoF, GNHC	Number of farm roads constructed with adequate budget for climate-resilience	35
2.	Strengthen inter-agency coordination and working linkages for farm road development	Weak institutional linkages and coordination between DoA/MoAF and Dzongkhag Administrations have led to non-conformity with guidelines and standards for farm road development	DoA/MoAF, MoWHS, Dzongkhag Administrations/ MoHCA	<ul style="list-style-type: none"> ↳ Review existing institutional arrangements for farm road development, analyze the gaps and come up with recommendations for strengthening coordination and institutional linkages; ↳ Convene inter-agency meetings/ workshops to discuss the review findings and implementation of recommendations; ↳ Incorporate the recommendations in the Farm Road Development Guidelines 	2013-2015	MoAF and MoWHS	Level of coordination between DoA/MoAF and Dzongkhag Administrations	13
3.	Institutional strengthening of the Engineering Division of DoA/MoAF and Dzongkhag Engineering Sectors	The institutional capacity of DoA/MoAF and Dzongkhag Engineering Sectors is limited for climate-resilient farm road development	MoAF, MoWHS and RCSC,	<ul style="list-style-type: none"> ↳ Staff training for DoA/MoWHS and Dzongkhag Engineers ↳ Equipment support to the Dzongkhag Engineering Sectors ↳ Review of existing staffing structure for engineering works at dzongkhag and development of dzongkhag staffing plan for engineering works based on the scale and nature of work ↳ Deployment of engineering staff according to the dzongkhag staffing plan for engineering works 	2013-2018	MoAF and MoWHS	↳ Proportion of staff in DoA/MoAF and Dzongkhag Engineering Sectors with improved knowledge and skills	420

Sector : Arable Farming / Agriculture

Technology: Vegetable production system with drip irrigation and mulches - small and medium scales and long term
 Innovation Stage: Research and development, Deployment and Diffusion

No	Key measure/ category	Priority (1- high, 2- med, 3-low)	Why is it needed?	Who?	When (0-5 years, 5-10 years, 10-20 years)?	How much will it cost?	Risks and indicators of success
	Financial incentives						
1	Tax exemption policy for importers of drip irrigation equipment, mulching supplies and facilities	1	This measure will help to increase availability of equipment and supplies and competitiveness between importers. As a result, cost drip irrigation equipment and other supplies are expected to decrease.	The Government; Ministry of Industry and Agriculture; Arable Farming Support Fund; Ministry of Finance	8-10 years	Government through Arable Farming Support Fund – about 5 million US\$; International donors – 5 million US\$; Private – 5 million US\$	Risk: The government revenue will be dropped. Success: Increased number of farmers who use water saving technologies, including drip irrigation and mulches
2	Long term and soft loans for importers, local manufacturers, repair service providers of drip irrigation techniques and supplies and recycling factories of plastic waste from mulches	1	Importers and local manufacturers have limited financial capacity and current loans conditions are short term and with high interest rate. Long term and soft loans are needed for importers, local manufacturers, repair service providers of drip irrigation techniques and supplies and recycling factories of plastic waste from mulches.	Banks and financial institutions coordinated by the Government, Arable Farming Support Fund, and SME Support Fund;	10-20 years	Soft loan of 1 million US\$ is required from the government and international donors per year for 4-5 years. Total cost is about 15-16 million US\$. Mulches – about 1.3 million US\$; local manufacturing and service- 1.4-2.0 million US\$; drip irrigation system 12 million US\$.	Risk: Importers of equipment and supplies should be identified through appropriate and transparent process. Success: Increased number of imported equipment and supplies; More local manufacturer and service providers of water saving equipment and supplies

7. TAPs – what are lessons learned and challenges for their implementation?

7.1 Lessons learned

Methodology for conducting TAPs consisted from a Handbook for conducting TNA for climate change, a guidebook on Overcoming barriers to transfer and diffusion of climate technologies, UNFCCC guidebook on preparing and presenting technology transfer projects for financing, UDP guidebooks on accessing international financing for climate change mitigation and adaptation, and TAP report template for mitigation and adaptation. Such a rich methodology helped countries to identify their priority sectors, subsectors, priority technologies, and technology inclusive actions. The handbook, guidebooks, and the TAP template were closely followed by all the countries involved in the TNA project, hence creating a logical and understandable platform for analysis per region, and comparable analysis amongst the three analyzed regions.

Most of the countries, when conducting the TAPs prioritized similar mitigation and adaptation sectors which were energy, water and agricultural sectors, with smaller regional exceptions such as agriculture sector in mitigation, and coastal zones and health sectors in adaptation.

Development and implementation of financial incentives on national level to support mitigation actions was mostly identified by countries as activity in their TAPs. Other identified actions were enhancing information and awareness of mitigation technologies, development of technical capacity, and development and implementation of targeted trainings to enhance technical capacity. This may indicate a strong attention of developing countries to lack of information and awareness and available human resources to develop, deploy, operate and maintain mitigation technologies.

Most of adaptation TAPs included activity on information and awareness of adaptation technologies in countries. This was followed by activities on enhancing technical capacity. These activities were given more preference than financial incentives for example, which was the most identified mitigation activity. In adaptation more attention was given to need to inform, learn from pilot projects and develop technical skills to operate and maintain adaptation technologies.

Countries in their mitigation and adaptation TAPs proved their understanding of the main elements of action plans and elaborated their action plans in a set of consequent activities, with responsible bodies and timelines for their implementation. Countries also assessed budget to undertake the action plans, in most cases elaborated per each activity of action plans. Comparing with the previously identified project ideas for implementation, the enhanced Guidance and the template assisted countries in more in depth conducting and reporting of what actions, timelines, responsibilities and cost are considered necessary by countries to enhance local implementation of environmentally sound technologies. Such in depth findings may provide a more solid background to available public and private funders to support the implementation.

7.2 Challenges

The identified barriers and enablers were for the first time in the TNA process built on and used for conducting TAPs. The enhancement of TNA process, in terms of focusing on TAPs besides the project ideas, was initially implemented through, at the time of the Phase I of the TNA project, newly elaborated guidance and templates. Such pioneering approach in limited project time and discussions with countries brought some challenges into the TAP guidance in terms of capturing of elements of TAPs such as potential of actions, impact of actions, and detailed information on cost, risk mitigation considerations, and modalities of monitoring of implemented actions.

The analysis has also shown that many countries do not have rich experiences with putting together an action plan on governmental level to be disseminated with purpose of its implementation. One of the main challenges was lack of a clear methodology on budget assessment resulting in insufficient elaboration of detailed budgets, and time flow of expenditures. Another challenge was risk assessment and steps proposed for the risk management. This information was discussed as needed for thorough project considerations by representatives of financial institutions during TNA experience sharing workshops. Hence there is a room for capacity building of national stakeholders to undertake TAP exercise in more comprehensive manner in future.

Access to finance to implement mitigation and adaptation technologies remains possibly the biggest challenge in developing countries. Financial community could assist in development of TAPs to consider elements allowing for a comprehensive assessment of proposed actions from the financial point of view including existing risks for investments. Therefore it was proposed by parties to the UNFCCC to involve financial stakeholders into the TNA process from the beginning. The reported TAPs proved that in most cases involvement of financiers was a challenge and hence there is a potential in the next TNA rounds to employ in the TNA process multi-sectoral TNA teams, including representatives of financial community. All these challenges were reflected in the enhanced guidance, which is currently under development and testing in the Phase II of the TNA project.

7.3 Key messages

This paper provided an in-depth overview of key findings from more than three hundred technology action plans conducted and reported by developing countries as an implementation related deliverable of their technology needs assessment reports. The following key messages were distilled from the paper:

- TAP methodology and guidance was followed by countries resulting in consistent results allowing comparative analysis to be made.
- Access to finance to implement mitigation technologies remains possibly the biggest challenge in developing countries, as countries frequently asked for financial incentives as one the TAP action.
- In adaptation information and awareness and enhancing technical capacity to develop, deploy, operate and maintain technologies was given priority to finance. Finance still played a significant role in adaptation TAPs, however many adaptation technologies were considered quite locally manageable, in case that local stakeholders are familiarized with them and trained to operate and maintain them.
- The new approach of delivering both TAP and project ideas and the relevant guidance and templates assisted countries in in-depth conducting and reporting of what actions, timelines, responsibilities and cost are considered necessary to enhance local implementation of environmentally sound technologies on both small and large scale.
- One of the main TAP preparation challenges was lack of a clear methodology on budget assessment resulting in insufficient elaboration of detailed budgets per activity, and of flow of expenditures in time, which would assist financial community to thoroughly analyze TAP investment options.
- The work of countries on TAPs could be further promoted as a basis to initiate future technology development, deployment, transfer and dissemination.
- Feasibility studies should be developed out of TAPs, which require national champions to be engaged and support of national decision makers in order to allow necessary capacity building, enabling environment and project development.
- The TAPs may also serve, due to their well-developed methodology and implementation oriented outcomes, as a sound input to the ongoing work in other processes such as INDCs both mitigation and adaptation, and NAPs in adaptation. Synchronizing these works may significantly strengthen investment portfolios of developing countries to allow more comprehensive look at their recent technology development and transfer needs.
- TAP knowledge may affect stakeholders when conducting their TAPs in future, to focus on strengths of the existing TAPS and also to consider their current gaps in terms of providing a sufficient bulk of information to allow further consideration of TAPs by financial sector stakeholders.
- The TAPs are opportunities to:
 - Discuss them as possible investment portfolio,
 - Consider their possible further development via feasibility and other studies,
 - Capitalize on in form of their further promotion,
 - Make other mitigation and adaptation communities (INDCs, NAPs etc) aware of added value the TAPs can provide in terms of nationally identified actions.