



APCTT
Asian and Pacific Centre
for Transfer of Technology

Consolidated Reply

Query 10 –
**Adaptation Technologies
Reaching Low-income
Communities in the Global South**

**Community of Practice (CoP)
on Climate Technologies**



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Community of Practice (CoP) on Climate Technologies

Shared Experiences, Smarter Solutions for Climate Action and Resilience

The Community of Practice (CoP) on Climate Technologies, launched by the Asian and Pacific Centre for Transfer of Technology (APCTT), aims to address climate change challenges in the Asia-Pacific region through technology cooperation and transfer. By leveraging the region's innovation capacities and good practices, the CoP enhances access to critical knowledge on climate technologies, fosters cross-border collaboration, and connects professionals engaged in delivering technological solutions to climate change. The objective of this Community of Practice is to:

- Promote collaborative problem-solving and policy-relevant dialogue
- Support the localization and transfer of innovations aligned with national priorities



Original Query by: Dele Juliuson, London; Paul McCormack, Ireland and Md Selim Reza, Bangladesh

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Across the Asia-Pacific region, climate adaptation technologies are advancing rapidly yet their benefits remain unevenly distributed. The communities facing the greatest climate risks, including low-income households, informal settlements and small island developing states, are often the least able to access the solutions being developed for them. Financing gaps, governance weaknesses, limited institutional capacity and fragmented technology transfer pathways deepen this divide. We want to learn from what members have directly experienced, observed or tested.

We invite you to share your perspectives on the following questions:

1. Think of a specific case in your country or region where a climate adaptation technology reached a low-income or underserved community. What made that delivery possible — and what nearly stopped it? How was local ownership genuinely built?
2. What is the single most persistent barrier you have encountered to equitable technology access? Have you seen any approach that has meaningfully reduced it — even partially?
3. Has your organisation or country used a specific financing instrument such as a green bond, blended finance structure or multilateral climate fund to extend technology access to a vulnerable group? What worked, what did not, and what would you do differently
4. When climate technologies are introduced into vulnerable or resource-constrained communities, what factors most strongly determine whether the technology is adopted, adapted and sustained over time.



Your inputs will directly inform regional dialogue on inclusive adaptation, equitable technology transfer and sustainable climate financing for vulnerable communities in Asia-Pacific and beyond.

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1. Summary of Responses

Query 10 invited members to share direct experience on four questions covering technology delivery, barriers, financing, and the conditions for sustained adoption. Responses spanned solar irrigation, indigenous crop systems, citizen science flood monitoring, digital trade infrastructure, early warning systems, and community-based governance. The barrier, almost every response suggests, is rarely the technology itself.

On specific adaptation technology reaching underserved communities, three cases stand out. In [Pakistan](#), solar-powered irrigation in Sindh and South Punjab, delivered through blended financing and farmer cooperatives trained local technicians. The key barriers were high upfront costs, weak maintenance ecosystems, and resistance to shifting from diesel. The [Giant Liang Model](#) in Thailand engaged over 500 households through farmer-to-farmer networks and community enterprises. The [RISE programme](#) ran citizen-based [flood monitoring](#) across 13 informal settlements in Suva, Fiji, and Makassar, Indonesia using a flood gauge, a phone camera, and WhatsApp. Over two years, 26 members sent more than 5,300 photos. It worked because the implementing team spent a year building community relationship before the project began, and WhatsApp was already part of their daily life. It nearly failed in Fiji when prepaid data top-ups lapsed mid-week, severing participation habits before they formed. Across all three above examples, delivery succeeded when communities were co-designers, not recipients. Members suggest that technology transfer, when conceived as a technical exercise, rarely delivers completely rather than when seen as a [socio-institutional transformation](#).

Among persistent barriers were a "[triple affordability challenge](#)": inability to pay upfront, lack of credit access, and high lender risk perception. Exclusion due to collateral in [formal credit](#), and [lack of micro and climate finance](#) access and inadequate [women's entrepreneurship](#) were other challenges. Partial remedies that worked were [pay-as-you-go models](#), microfinance-linked lending, and results-based financing. The most vulnerable, affordable, simple, locally adaptable solutions such as mobile early warning systems and

[IoT flood monitoring](#) work best when paired with genuine capacity building. Two further barriers pertained specifically to [small island developing states](#) and informal settlements. Firstly, inadequacy of finance: for example, GCF adaptation finance to Pacific SIDS averages US\$70 million per country against an IMF estimate of US\$1 billion annually. Secondly, the population of informal settlements Eastern and Southeast Asia is over 306 million, containing communities where land tenure insecurity and absent utility connections make standard delivery models inapplicable from the start. A [review](#) of more than 1,600 adaptation studies found that just 1% of these had considered disability, a crucial gap when early warning systems require physical mobility to act on.

On financing instruments to reach vulnerable groups, global mechanisms such as GCF, ADB, and World Bank were valued but criticized for [prioritizing large-scale projects](#) over the localized, small-ticket mechanisms underserved communities need. [Community revolving funds](#) and results-based financing are other underused instruments. Grants could also facilitate adoption, but sustainability requires embedding technologies in [local planning and budgets](#), as seen in the RISE example in Indonesia, where continuation depended on national disaster agencies, not donors. A crucial structural issue in financing is that most of the climate finance reaches the Global South as loans, and some countries are already repaying more than they receive. [UNEP](#) points out that adaptation captures only a third of total climate finance, with major donor aid budgets falling further. The grant-versus-loan composition deserves as much attention as disbursement mechanisms. Digital payments are another opportunity. Some projects use [stablecoin payment](#) rails to reduce US\$5 billion in annual intra-African currency conversion losses, thereby lowering transaction costs as a form of financial inclusion.

Members point to four interlinked factors that determine [sustained adoption, adaptation, and sustainability](#): economic viability (visible financial returns), contextual relevance (local fit, not imposed solutions), institutional capacity (maintenance systems built alongside the technology, not assumed), and, above all, community ownership through genuine co-design. RISE adds a fifth: adoption is a habit, and habits break when small supports lapse.

Reliable data access, recognition, and two-way exchange matter as much as institutional capacity. Other [emerging technologies](#) with adoption implications are AI-powered early warning systems, digital city twins, gene-edited drought-tolerant crops, and satellite-AI monitoring. On smart urban systems, since cities are already changing, [urban governance](#) needs to keep pace. [Other scholars](#) challenge the concept of sustained adoption itself, arguing that while we change our phones frequently, we expect farmers to stick to the same technology for long. They propose understanding adaptation as [a sequence of adaptive actions](#). With 70% of global [renewable energy potential](#) being in the Global South, the Asia Pacific region is leading its own energy transition through [South-South cooperation](#), not waiting for transfers from the North. The IDMC recorded over 26 million climate displacements in Asia-Pacific alone in 2023. This raises issues of longevity of cooperative structures and maintenance networks when a community is scattered by disaster.

In conclusion, the technologies, financing structures, and governance frameworks to extend climate adaptation to low-income communities already exist. However, climate justice will be determined not by technological sophistication, but by who benefits from innovation and who remains excluded. That decision will be made in [farmer cooperatives, community nurseries, flood monitoring WhatsApp groups, local maintenance networks, and micro-finance windows](#) and not in laboratories or multilateral negotiations.

2. Relevant Experiences

Country	Key Purpose & Role	Organizations Involved	Link
<p>Bangladesh Solar Home Systems Off-Grid Electrification for Low-Income Rural Households</p>	<p>IDCOL financed off-grid solar electrification for over 20 million rural, low-income people through partner microfinance institutions, who extended 3–10-year micro-loans so households could afford a system with a low-down payment. The financing model not the panel itself is what made this reach the poor.</p>	<p>IDCOL; World Bank; partner microfinance NGOs</p>	<p>worldbank.org</p>
<p>West Africa (Ghana, Mali, Burkina Faso) Ignitia iska SMS Forecasts Climate Information for Smallholder Farmers</p>	<p>Hyperlocal, GPS-specific rainfall forecasts are sent to smallholder farmers by basic SMS for a few cents a day, requiring no smartphone or literacy beyond reading a short text. Ghana field trials found yield and income gains for most subscribers by letting farmers time planting around real rain</p>	<p>Ignitia; World Food Programme; Business Call to Action; mobile network operators</p>	<p>innovation.wfp.org</p>



Country	Key Purpose & Role	Organizations Involved	Link
	instead of guesswork.		
<p>India / Ahmedabad Cool Roofs Initiative Heat Adaptation for Low-Income Urban Households</p>	<p>Ahmedabad's Heat Action Plan added heat-reflective paint and low-cost ModRoof material (coconut husk and paper waste) to slum roofs, cutting indoor temperature by 2–5°C for households that cannot afford active cooling. Mahila Housing Trust delivered this directly into informal settlements that formal building codes do not reach, later adding a parametric heat-insurance payout for women in the same communities.</p>	<p>Ahmedabad Municipal Corporation; Mahila Housing Trust; NRDC; IIPH-Gandhinagar</p>	<p>who.foundation</p>
<p>Kenya SunCulture Solar Irrigation: Pay-As-You-Grow Climate-Resilient Farming</p>	<p>Solar irrigation pumps reach smallholders through a “Lipa Pole Pole” (pay-as-you-grow) credit model a small deposit plus monthly instalments instead of the lump sum a diesel pump or grid</p>	<p>SunCulture; Shell Foundation; UK FCDO (CASEE programme)</p>	<p>shellfoundation.org</p>



Country	Key Purpose & Role	Organizations Involved	Link
	<p>connection would require. A Duke University evaluation across six counties found measurable welfare and nutrition gains among adopters versus non-adopters.</p>		
<p>Bangladesh Cyclone Preparedness Programme Community-Based Early Warning for Coastal Households</p>	<p>A 76,000-strong volunteer network disseminates official cyclone signals door to door sometimes via mosque megaphones reaching informal settlements with no reliable broadcast or internet access. A newer mobile app (with Practical Action and the World Bank) lets volunteers verify warning timing independently rather than waiting on relayed instructions.</p>	<p>Bangladesh Red Crescent Society; Bangladesh Meteorological Department; Government of Bangladesh; IFRC</p>	<p>bdrcs.org</p>
<p>Vietnam / Ca Mau Mangrove Restoration</p>	<p>Community-based mangrove planting in front of sea dikes absorb storm-surge energy and</p>	<p>IUCN; UNDP Viet Nam (Climate Promise); Ministry of</p>	<p>iucn.org</p>



Country	Key Purpose & Role	Organizations Involved	Link
<p>Nature-Based Coastal Protection for Aquaculture Communities</p>	<p>cut dike-maintenance cost. Restoration is paired with mangrove-shrimp aquaculture so coastal households have an economic reason to maintain the trees rather than a conservation mandate imposed on them.</p>	<p>Agriculture and Rural Development</p>	
<p>Senegal Climate Information Services Radio-Based Advisories for Smallholder Farmers</p>	<p>Downscaled seasonal and daily forecasts reach farmers, pastoralists and fisherfolk through community radio; reach grew from a pilot of several hundred to roughly two million by partnering with stations already trusted by households without smartphones. Field-level rain gauges and face-to-face agromet training filled the gap pure broadcast could not close.</p>	<p>CGIAR CCAFS; ANACIM (Senegal Meteorological Agency); ISRA; USAID</p>	<p>ccafs.cgiar.org</p>
<p>Fiji Early</p>	<p>A US\$15.4 million program is rolling out</p>	<p>UNDP; Green Climate Fund;</p>	<p>undp.org</p>



Country	Key Purpose & Role	Organizations Involved	Link
<p>Warnings for All Multi-Hazard Alerts for Remote and Underserved Communities</p>	<p>cyclones, flood and sea-level-rise warnings to roughly 416,000 people, explicitly targeting remote islands and highland villages that current systems miss the hardest-to-reach communities, not the technically easiest.</p>	<p>Government of Fiji</p>	
<p>India / Karnataka SELCO Solar Livelihoods & Health Decentralized Energy for the Rural Poor</p>	<p>Solar power is paired with livelihood and healthcare delivery: solar sewing machines, looms and rice hullers for home-based workers, and solar refrigeration for vaccine cold chains and labor rooms in one clinic cutting electricity cost from roughly ₹10,000 to ₹400 a month. Financing is bundled with the hardware so customers without collateral can still get credit</p>	<p>SELCO Foundation; SELCO Solar; IKEA Foundation; Ministry of Health and Family Welfare (India)</p>	<p>hbs.edu</p>
<p>Vanuatu Van-KIRAP</p>	<p>A GCF-financed multi-hazard early warning</p>	<p>Vanuatu Meteorology and</p>	<p>gsma.com</p>



Country	Key Purpose & Role	Organizations Involved	Link
MHEWS Multi-Hazard Early Warning for Cyclone-Vulnerable Communities	system strengthens cyclone alerting for a country where a single cyclone (Pam, 2015) destroyed assets equal to 64% of GDP. A community layer trains women leaders to receive and relay warnings by SMS, since they are often the most consistent point of contact in remote villages	Geo-Hazards Department; SPREP; Green Climate Fund; GSMA	

3. Related Resources

Original Research/Report Title	Authors	Key Summary	Link
<p>Climate Change 2022: Impacts, Adaptation and Vulnerability Summary for Policymakers (AR6 WGII)</p>	<p>IPCC</p>	<p>Reference assessment on how climate impacts and adaptation limits fall disproportionately on the poorest and most exposed populations. Frames adaptation, vulnerability and equity as inseparable the conceptual backbone most other items here build on.</p>	<p>ipcc.ch</p>
<p>Adaptation Gap Report 2024: Come Hell and High Water</p>	<p>UNEP</p>	<p>Annual assessment showing the adaptation finance gap for developing countries sits at US\$187–359 billion a year, even after the largest single-year increase in adaptation finance since the Paris Agreement.</p>	<p>unep.org</p>
<p>Locally Led Adaptation: From Principles to Practice</p>	<p>Coger, T. et al., World Resources Institute</p>	<p>Turns WRI/IIED's eight Principles for Locally Led Adaptation into concrete financing and governance steps, drawing</p>	<p>wri.org</p>



Original Research/Report Title	Authors	Key Summary	Link
	(2021)	on cases from Africa, Asia-Pacific and the Caribbean.	
Off-grid Renewable Energy Statistics 2025	IRENA	Annual dataset tracking off-grid solar, hydro, bio-energy and wind capacity and people served by region. Global off-grid capacity reached 11.1 GW in 2024, connecting ~86 million people, three-quarters of them in Africa.	irena.org
Data-Driven Advisory Services for Climate-Smart Smallholder Agriculture	GSMA Agri Tech	Assesses how satellite, weather and farm-profile data are turned into advisory services for smallholders in India, Kenya and Nigeria, and what is needed to move these services past pilot stage.	gsma.com
Improving Access to the Green Climate Fund: How the Fund Can Better Support	World Resources Institute (2021)	Finds 42 of 62 accredited Direct Access Entities had received no project funding despite GCF's Readiness Programme and Simplified Approval	wri.org



Original Research/Report Title	Authors	Key Summary	Link
Developing Country Institutions		Process these mechanisms have not yet closed the access gap.	
Potential of South-South and Triangular Cooperation on Climate Technologies for Advancing NDCs and NAPs	UNFCCC Technology Executive Committee & UN Office for South-South Cooperation (2018)	Documents developing countries transferring adaptation technologies directly to one another, by passing the usual North-South pathway, particularly in water and agriculture.	sdg.iisd.org
Technology Justice: A Call to Action	Practical Action (2016)	Argues access to technology - not its mere existence is the central injustice. Sets out a five-part framework (access, use, innovation, governance, finance) for judging whether a transfer is just.	practicalaction.org
Delivering Real Change: Getting International Climate Finance	Soanes, M., Rai, N., Steele, P., Shakya, C.	Traces how climate finance flows once it leaves an international fund, identifying which design features let money	iied.org

Original Research/Report Title	Authors	Key Summary	Link
to the Local Level	and MacGregor, J., IIED (2017)	reach local actors versus stall at national ministries.	
Scaling Up Climate Services for Farmers: Mission Possible	Tall, A. et al., CCAFS (2014)	Synthesizes 18 case studies of climate advisory services for smallholders, including India's Agromet Advisory Service and Mali's PAMR programme, on moving pilots into durable national systems.	cgspace.cgiar.org
Shifting Climate Adaptation Finance to Local Communities through Effective Intermediaries	Grutter, N., Moss, L., Aung, M. and Joshi, R., IIED (2025)	Sets out how intermediary organizations can route adaptation finance to women, Indigenous peoples and other groups multilateral funds structurally bypass.	iied.org
Asia-Pacific Climate Report: Catalyzing Finance and Policy Solutions	Asian Development Bank (2024)	Estimates the region's annual adaptation investment need at US\$102–431 billion against ~US\$34 billion tracked for 2021–2022, attributing the gap partly to	adb.org



Original Research/Report Title	Authors	Key Summary	Link
		weak markets deterring private adaptation finance.	

4. Relevant Organizations/Initiative

Organization / Initiative	Key Role & Activities	Link
<p>Climate Technology Centre and Network (CTCN)</p>	<p>Operational arm of the UNFCCC Technology Mechanism. Delivers free technical assistance to develop countries on request feasibility studies, technology selection, regulatory advice</p> <p>channeled through National Designated Entities so requests are country driven.</p>	<p>ctcn.org</p>
<p>Green Climate Fund (GCF)</p>	<p>Largest dedicated climate fund, with a Simplified Approval Process for smaller adaptation projects and an Enhancing Direct Access pilot meant to channel grants to sub-national and community organizations. Independent reviews, including GCF's own evaluation unit, find these routes still move slowly relative to their stated purpose.</p>	<p>greenclimate.fund</p>
<p>Adaptation Fund</p>	<p>Pioneered Direct Access in international climate finance, letting accredited national entities manage the full project cycle themselves. Its Climate Innovation Accelerator (AFCIA) runs a small-grants window to pilot and scale innovative adaptation</p>	<p>adaptationfund.org</p>



Organization / Initiative	Key Role & Activities	Link
	technologies, including conflict-sensitive support for climate-affected communities.	
UNDP — Climate Promise / Early Warnings for All	Supports national governments on mangrove restoration, carbon-stock assessment and early-warning rollout; current EW4All projects in Fiji and across the Pacific specifically target communities’ current systems do not reach.	undp.org
SPREP (Secretariat of the Pacific Regional Environment Programme)	Regional lead on Pacific early warning systems, coordinating the ten-year Weather Ready Pacific programme and country systems such as Vanuatu's Van-KIRAP, working through national meteorological services down to community-level dissemination.	sprep.org
Practical Action	Development NGO built around “Technology Justice” - framing unequal access to existing technology as an injustice rather than a gap to close eventually. Active on flood early-warning systems, off-grid energy and last-mile information services.	practicalaction.org
International Institute for Environment and Development (IIED)	Co-authored the original Principles for Locally Led Adaptation with WRI. Runs ongoing work helping	iied.org



Organization / Initiative	Key Role & Activities	Link
	<p>county and local governments (Kenya, Mali, Senegal, Tanzania) set up their own adaptation funds, plus newer work on routing finance through intermediaries to marginalized groups.</p>	
<p>CGIAR -Climate Change, Agriculture and Food Security (CCAFS)</p>	<p>Research programme that built and evaluated national climate information services for smallholders, including Senegal's radio-based model and India's agromet advisory assessments the evidence base behind much of what is known to work in this space.</p>	<p>ccaafs.cgiar.org</p>
<p>BRAC</p>	<p>One of the largest NGOs working directly in climate-vulnerable communities: climate adaptation clinics (one-stop farmer extension services), climate-resilient low-cost housing that doubles as cyclone shelter, and a Climate Bridge Fund channeling donor money to local NGOs.</p>	<p>brac.net</p>
<p>GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit)</p>	<p>German development agency implementing adaptation projects across Africa, Asia and Latin America on behalf of BMZ -early warning support in Mozambique, climate-risk-informed planning Bangladesh, climate finance literacy work with Indian financial institutions.</p>	<p>giz.de</p>

5. Responses in Full

1. [Irum Tariq, Member Standing Committee on Smog and Climate, LCCI; CEO, Exodus Green Pvt. Ltd., Pakistan](#)
2. Catherine Kariuki, Executive Director, SME Foundation, Kenya; [Response 1](#); [Response 2](#)
3. [Jagannath Mahanta, India](#)
4. Zubia Raza, IRMS Risk Manager, Pakistan [Response 1](#); [Response 2](#)
5. [Dr. Nantiya Panomjan, Assistant Professor, Faculty of Agriculture, Thaksin University, Thailand](#)
6. [Lady Ace Flores, Philippines](#)
7. [Enriko Siahaan, NbS Expert, Sintang Regency Border Infrastructure, Indonesia](#)
8. [Engr. Md Selim Reza, System Analyst, Ministry of Finance, Bangladesh](#)
9. [Prabhakar SVKR, Principal Policy Researcher \(adaptation\) at Institute for Global Environmental Strategies \(IGES\), Yokohama, Kanagawa, Japan](#)
10. [Wasswa Shafik, Dig Connectivity Research Laboratory, Canada](#)
11. [Sohail Akhtar, Senior Scientist, PCSIR Lab Complex, Karachi, Pakistan](#)
12. [Monday vian John mary, TIP Fellow, Policy and Market Research, CEO spul foods, Uganda](#)
13. [Gnana Bharathi, Tamil Nadu, India](#)
14. [APCTT INPUTS 1](#)
15. [APCTT INPUTS 2](#)
16. [APCTT INPUTS 3](#)

Responses:

1. Irum Tariq, Member Standing Committee on Smog and Climate, LCCI; CEO, Exodus Green Pvt. Ltd., Pakistan

Climate adaptation technologies across the Asia-Pacific region are advancing rapidly, yet their benefits remain unevenly distributed. Vulnerable populations, including low-income households, informal settlements, and small-holder farmers, face systemic barriers to accessing these solutions.

This brief draws on field-level insights from Pakistan and similar developing contexts to highlight practical challenges and policy actions required to ensure equitable, scalable, and sustainable technology adoption.

1. Case Insight: Solar Irrigation in Rural Pakistan

A notable example of climate adaptation technology deployment is the introduction of solar-powered irrigation systems in water-stressed regions of Sindh and South Punjab.

▪ **Enablers of success:**

- Blended financing (public subsidy + donor support + farmer contribution)
- Community engagement via NGOs and local facilitators
- Demonstration models showcasing economic returns
- Simplified and locally adaptable technology

▪ **Key risks and constraints:**

- High upfront costs despite subsidies
- Limited technical awareness among end-users
- Weak rural service and maintenance ecosystems
- Behavioral resistance to shifting from conventional diesel systems

▪ **Local ownership mechanisms:**

- Formation of farmer cooperatives and water user groups
- Cost-sharing models to ensure stakeholder commitment
- Training of local technicians for maintenance
- Peer learning and community-led adoption

2. Persistent Barrier: Affordability and Financial Access

The most critical barrier to equitable access is limited affordability coupled with financial exclusion.

▪ **Low-income communities:**

- Lack of access to formal credit systems
- Cannot meet collateral requirements
- Face high perceived risk from financial institutions

▪ **Promising approaches (partial success):**

- Pay-as-you-go (PAYG) models for decentralized energy solutions
- Microfinance-linked climate technology lending
- Results-based financing and targeted subsidies
- Despite these innovations, scale and integration remain insufficient.

3. Role of Climate Financing Instruments

Global and regional financing mechanisms including the Green Climate Fund, Asian Development Bank, and World Bank have played a role in enabling adaptation initiatives.

▪ **Success factors:**

- Risk-sharing mechanisms attracting private investment
- Funding for infrastructure and pilot scaling
- Support for national adaptation strategies

▪ **Limitations observed:**

- Complex and slow disbursement processes
- Limited accessibility for SMEs and grassroots organizations
- Weak last-mile delivery frameworks
- **Policy gap:** Financing often prioritizes large-scale projects, while underserved communities require localized, flexible funding mechanisms.

4. Determinants of Adoption and Sustainability

Successful adoption of climate technologies depends on four core factors:

1. Economic Viability

Technologies must deliver clear financial benefits (cost savings or income generation).

2. Contextual Relevance

Solutions must align with local environmental, cultural, and technical conditions.

3. Institutional and Technical Capacity

Sustainable adoption requires:

- Local technical skills
- Maintenance systems
- Supply chain availability

4. Community Ownership

Co-designed solutions with community participation ensure long-term sustainability and trust.

5. Policy Recommendations

To bridge the climate adaptation technology gap, policymakers and stakeholders should:

A. Expand Inclusive Financing

- Develop micro-climate finance frameworks targeting low-income users
- Promote blended finance models tailored for small-scale deployment
- De-risk lending for climate technologies via guarantees and insurance

B. Strengthen Last-Mile Delivery Systems

- Support local SMEs and service providers
- Build rural maintenance and technical ecosystems
- Invest in community-based extension services

C. Simplify Access to Climate Funds

- Streamline application and disbursement processes
- Enable direct access for local organizations and intermediaries
- Introducing small-grant windows for community-led projects

D. Promote Community-Centric Design

- Institutionalize participatory planning approaches
- Integrate indigenous knowledge with modern technologies
- Support peer learning and demonstration models

E. Build Capacity and Awareness

- Provide technical training at the community level
- Strengthen institutional capacity for implementation
- Encourage public-private partnerships for knowledge transfer

2. Catherine Kariuki, Executive Director, SME Foundation, Kenya

- 1) **Digital Adaptation AfCFTA's ADAPT Initiative ADAPT (Africa Digital Access and Public Infrastructure for Trade):** Launched in 2025, now piloted in Kenya, Morocco, and Nigeria. Core features: Digital identity and "digital passports" for traders.
- 2) Interoperable data exchange and digitized trade documentation.
- 3) Stablecoin payment rails to reduce \$5 billion lost annually to currency conversion costs. The Impact: Could boost intra-African exports by 80% and generate \$450 billion by 2035. SME relevance: Simplifies compliance, lowers transaction costs, and enables SMEs to trade across borders without duplicating paperwork.

3. Jagannath Mahanta, India

Adapting technology in cities in a sustainable way is a positive step toward the future. Europe is leading the way through initiatives like carbon credits and reducing carbon footprints, which shows that the world is rapidly changing in a better and more environmentally responsible direction.

I think sustainable technology in cities is one of the best changes happening right now. Europe is leading in areas like carbon credits and reducing carbon footprints, and because of that many countries are also becoming more environmentally conscious. There are many technologies helping cities become smarter and cleaner such as smart grids for saving electricity, green buildings with solar panels and rainwater harvesting, electric vehicles, smart traffic systems to reduce congestion, and waste-to-energy plants. Even concepts like vertical farming and water recycling are becoming more common in urban areas.

All these changes show that technology is not only making life easier but can also help create a more sustainable future if used properly.

4. Zubia Raza, IRMS Risk Manager, Pakistan

For low-income communities in the Global South, and in Pakistan specifically, adaptation technologies should be affordable, locally maintainable, scalable, and resilient to climate hazards such as heatwaves, floods, droughts, water scarcity, and food insecurity.

Priority Adaptation Technologies in Pakistan:

1. Climate Resilient Water Management
2. Heat Adaptation Technologies
3. Climate Smart Agriculture
4. Disaster Risk and Flood Management Technologies
5. Digital Adaptation Technologies

6. Nature-Based Adaptation Technologies

The most efficient use of adaptation technologies in Pakistan is to support it with:

- Local community ownership and capacities
- Access to micro and climate finance
- Women's participation and entrepreneurship
- Integration with national disaster risk reduction plans and climate policies
- Private-public partnerships for deployment.

In a climate adaptive portfolio for Pakistan the following technologies must be prioritized: cool roofs, climate smart agriculture, flood early warning systems, rainwater harvesting, solar irrigation pumps, and mobile climate information system as they all are relevant for enhancing resilience at a low cost and can effectively reach vulnerable groups.

5. Dr. Nantiya Panomjan, Assistant Professor, Faculty of Agriculture, Thaksin University, Thailand

I would like to share an experience from Southern Thailand, where our team at Thaksin University has been working with low-income rural households to strengthen climate resilience through a community-based agricultural innovation known as the “Giant Liang Model” (*Gnetum gnemon* var. *gnemon*).

The adaptation technology we introduced is a low-cost propagation system called Liang Propagation Technology (LPT), which enables farmers to produce high-quality planting materials through air-layering and community nurseries. Giant Liang is a perennial indigenous crop that can be cultivated under rubber and fruit tree systems, requires relatively low water inputs, tolerates variable climatic conditions, and provides year-round harvests. These characteristics make it suitable for smallholder farmers to face increasing climate uncertainty.

What made the delivery successful was the strong partnership among local communities, community enterprises, local government agencies, and the university. Rather than transferring technology in a top-down manner, farmers participated in selecting mother plants, testing propagation techniques, establishing nurseries, and developing local markets. This participatory approach created trust and genuine local ownership.

The most persistent barrier we encountered was access to finance and market confidence. Many vulnerable households were hesitant to invest in a new crop without assurance of economic returns. To address this challenge, we established demonstration plots, farmer-to-farmer learning networks, and market linkages through community enterprises. We also promoted value-added products such as processed Liang-based foods to diversify income sources.

To date, the initiative has engaged more than 500 households across Southern Thailand and contributed to increased income opportunities through seedling production, fresh leaf sales, and value-added processing activities. More importantly, the model has enhanced community resilience by reducing dependence on a single source of income and encouraging sustainable use of local biodiversity.

One lesson we have learned is that adaptation technologies succeed when they are embedded within local livelihood systems and supported by long-term capacity building, community leadership, and market development. Technology alone is not enough; social capital, financing mechanisms, and local ownership are equally important for sustainable adoption.

We welcome opportunities to collaborate and exchange experiences on climate-resilient agriculture, community-based adaptation, technology transfer, and inclusive livelihood development across the Asia-Pacific region.

We are currently seeking international partners to scale community-based climate adaptation models, develop climate-resilient food systems, and

strengthen market access for vulnerable farming communities in Southeast Asia.

We would be pleased to connect with organizations, researchers, development agencies, and climate finance institutions interested in collaborative pilot projects and knowledge exchange.

A short documentary highlighting the community transformation journey and local ownership development can be viewed [here](#).

6. Lady Ace Flores, Philippines

It's huge impact on any country to adapt technologies wherein many factors need to be considered. The success factors that can be considered are to have an organization that can facilitate and promote to simplify the community to be more cooperative and can easily innovate to create a system to sustain and manage end-users. With this, many countries can keep up with others.

7. Enriko Siahaan, Nbs Expert, Sintang Regency Border Infrastructure, Indonesia

As our contribution here, data on climate change can be retrieved from the World Bank Climate Portal and ADB Report Profiling. Please find our presentation on adaptation technologies for low-income communities below:

[Presentation: UNESCAP Query 10 — Adaptation Technologies for Low-Income Communities](#)

8. Catherine Kariuki, Executive Director, SME Foundation, Kenya

Digital Adaptation – AfCFTA’s ADAPT Initiative

ADAPT (Africa Digital Access and Public Infrastructure for Trade) Launched in 2025, now piloted in Kenya, Morocco, and Nigeria. The Core features are-Digital identity and “Digital Passports” for traders.



Interoperable data exchange and digitized trade documentation. Stablecoin payment rails to reduce \$5 billion lost annually to currency conversion costs. The impact could boost intra-African exports by 80% and generate \$450 billion by 2035. For SME its relevance is that it simplifies compliance, lowers transaction costs, and enables SMEs to trade across borders without duplicating paperwork. ADAPT was launched to solve some of the biggest barriers to intra-African trade, such as fragmented customs systems, paper-based trade documentation, slow cross-border payments, difficult verification of business identities, high compliance costs for SMEs and limited interoperability between African trade platforms.

Already in Kenya trade dynamics are emerging, such as the shift from regional to continental thinking, not just focusing on the East African Countries but connecting now with other countries such as Ghana and Egypt. Service exports are becoming more important such as those in ICT and financial services. This favors Kenya in its digital and knowledge economy. Finally digital trade is the next battlefield and Kenya's fintech innovation and already established mobile payments made it a forerunner in this program.

Challenges persist such as the trade knowledge gap, logistics runaway costs, general export readiness and financing gap.

To measure ADAPTS' success the following should be used to gauge the initiative later-such as the number of SMEs exporting under AfCFTA, growth in intra-African exports from Kenya, participation of women and youth-owned enterprises, adoption of digital trade infrastructure through ADAPT and finally expansion of Kenyan service exports across Africa.

9. Engr. Md Selim Reza, System Analyst, Ministry of Finance, Bangladesh

In my view, adaptation technologies for low-income communities in the Global South must be affordable, simple, and locally adaptable. Many successful solutions are those that combine community participation with low-cost digital tools such as mobile-based early warning systems, climate

information services, and simple IoT-based monitoring for floods, rainfall, and agriculture.

Equally important is capacity building and local ownership, so that communities can maintain and use these technologies independently without high external dependency.

Strengthening digital inclusion and integrating these tools with national disaster and climate systems can significantly improve resilience for vulnerable populations.

10. Prabhakar SVKR, Principal Policy Researcher (adaptation) at Institute for Global Environmental Strategies (IGES), Yokohama, Kanagawa, Japan

1. An Example of Effective Technology Delivery

A good case is the launch of climate information services and climate-smart farming methods in at-risk agricultural communities in Southeast Asia. The key to success was strong collaboration with local governments, extension services, and community leaders, while challenges included limited funding, technical skills, and weak local ownership. Strengthening local ownership involves engaging communities in choosing, testing, and adapting technology to fit local needs.

2. The Biggest obstacle to Fair Technology Access

The biggest obstacle is usually not the technology itself, but rather the lack of institutional capacity and financial resources to maintain its use. Strategies that merge technology transfer with capacity building, local partnerships, and ongoing technical support have proven to be more effective than isolated technology deployments.

3. Funding Options for Technology Access

Numerous adaptation technologies have received backing from multilateral climate funds and development aid instead of commercial financing. While grants and concessional funding can kickstart adoption, long-term sustainability often relies on embedding technologies into local planning and

budgets. A stronger focus on operation, maintenance, and institutional capacity would enhance long-term results.

4. Factors influencing long-term adoption

Adaptation technologies should perhaps be viewed as a sequence of adaptive actions rather than a permanent state of a state of permanent. We change our phones every once a while and expect farmers to stick to same technology for long and doesn't seem to fit the logic. Hence, rather than viewing technology adoption as a one-time decision followed by permanent use, adaptation technologies may be better understood as part of an evolving sequence of adaptive actions. The key question is not whether the same technology is used indefinitely, but whether communities have the capacity, resources, and institutional support to continuously adopt, adapt, replace, or upgrade technologies as risks and needs change over time.

11. Zubia Raza, IRMS Risk Manager, Pakistan

Few of the Emerging Adaptation Technologies are listed below:

AI-powered climate forecasting and early-warning systems: Analyze large volumes of weather, environmental, and historical data to predict extreme climate events and issue advance warnings, enabling governments, businesses, and communities to take preventive action and reduce risks.

Urban digital twins: A digital model of a city integrating data on transportation, utilities, buildings, traffic, energy consumption, and public services for coordinated climate response.

Gene-edited drought- and heat-tolerant crops: Climate-resilient agricultural varieties developed through precision genetic technologies to enhance tolerance to water scarcity and elevated temperatures, thereby improving productivity and strengthening food security.

Precision irrigation and smart water infrastructure: Enable efficient use of water by delivering the right amount of water at the right time and place, reducing waste while improving agricultural productivity and water resource management.



Satellite-AI monitoring: Uses satellite data and artificial intelligence to track environmental changes, predict disasters, and support the protection and sustainable management of ecosystems.

Climate-resilient urban infrastructure: Real-time sensor networks to monitor and manage transportation, energy, water, and public services, helping cities adapt to climate change and extreme weather events.

Integrated AI decision-support systems: Help governments and communities make informed decisions by analyzing complex data, forecasting outcomes, and providing actionable recommendations in real time.

12. Wasswa Shafik, Dig Connectivity Research Laboratory, Canada

The central challenge in extending climate adaptation technologies to low-income communities is not technological scarcity but the persistent misalignment between innovation systems and the socio-economic realities of vulnerable populations. Across many countries in the Global South, adaptation technologies already exist—climate-smart agriculture, early warning systems, solar-powered irrigation, drought-resistant crops, digital weather advisory platforms, and decentralized water harvesting systems. Yet adoption remains uneven because technology transfer is often conceived as a technical exercise rather than a socio-institutional transformation process.

A recurring lesson from African and Asian contexts is that successful adaptation occurs when communities become co-designers rather than recipients. Technologies introduced through participatory frameworks, where local knowledge, indigenous practices, gender dynamics, and livelihood strategies are integrated into deployment models, demonstrate significantly higher rates of long-term adoption and maintenance. Ownership emerges not from training workshops alone but from meaningful involvement in problem definition, technology customization, and governance.

The most persistent barrier remains financing. Vulnerable communities face a "triple affordability challenge": inability to pay upfront costs, limited access to credit, and high perceived investment risks by financiers. Traditional climate finance mechanisms often prioritize project-scale efficiency over

distributive equity. Blended finance structures, community revolving funds, and results-based financing mechanisms have shown promise, particularly when coupled with local cooperatives and microfinance institutions that understand community risk profiles.

Equally important is institutional capacity. Many adaptation initiatives fail not because technologies are inappropriate, but because of extension services, maintenance ecosystems, and knowledge support networks disappear once donor funding ends. Sustainable adoption requires moving beyond project-based interventions toward ecosystem-building approaches that strengthen local innovation capabilities, repair networks, and community-led governance structures.

Looking ahead, climate technology transfer should be evaluated not merely by the number of technologies deployed but by three deeper indicators: adaptive capacity created, resilience outcomes achieved, and equity of access ensured. The question is no longer whether adaptation technologies can reach low-income communities; it is whether our governance, financing, and innovation systems are willing to prioritize inclusion over scale and empowerment over deployment. Climate justice will ultimately be determined not by technological sophistication, but by who benefits from innovation and who remains excluded.

13. Sohail Akthar, Senior Scientist, PCSIR Lab Complex, Karachi, Pakistan

Across the Asia-Pacific region, climate adaptation technologies are evolving swiftly. And developing climate adaptation technologies, along with accomplishment in the Global South is attained through changes in countries policies and means for solving problems. Till now, some or few countries are now leaning towards adoption rather than waiting for technologies from the Global North. These technological adaptations and changes are aroused from various resources such as traditional technology transfer, cooperation between South-South, innovation for climate modeled technologies, development of methodologies for private financing, and speedy real-world,

practical and grassroots technology deployment.

Adoption and sustainability are not determined by the technology alone, but by transformation and traditions embedded for financial, institutional, social, and knowledge systems of a country. Yet financing gaps, governance weaknesses, limited institutional capacity, and parted technology transfer pathways continue to dig out the technological gap, but it is impartial to obtained. Partial successes across Global South could be observed, such as subsidized and government-backed solar microgrids, government-backed cooling centers, and regional cooperation platforms for farmers. Climate resilience infrastructure development needs cohesive procedures, for being beneficial and in support to low-income society and fill-up people's knowledge gap from poor equity.

To obtain firm results, strongest programs such as provide subsidies and blended finance, align policies with local institutions, involve communities in co-design, and invest in training and knowledge transfer so that adaptation measures can be implemented effectively and measured over time. When climate technologies are introduced into vulnerable or resource-constrained communities, their adoption, adaptation, and long-term sustainability are most strongly determined by four interlinked factors:

1. Affordability and Financing Models: Even low-cost technologies remain inaccessible without subsidies, concessional lending, or blended finance. Communities adopt and sustain technologies when financial mechanisms reduce upfront costs and spread risk through mechanisms such as investment insurance.

2. Institutional and Governance Support: Local governance structures and institutional capacity determine whether and how technologies are embedded into planning frameworks. Weak governance often leads to disjointed, temporary programmes without policy integration or continuity.



3. Community Ownership and Co-operational purpose: Technologies are more likely to be sustained when communities are engaged in design, deployment, and maintenance. Co-ownership builds trust, ensures cultural fit, and strengthens local stewardship.

4. Knowledge Transfer and Capacity Building: Sustained adoption depends on whether local actors have the skills to operate, maintain, and adapt technologies. The transformation is happening because renewable energy is now the fastest and cheapest path to prosperity for emerging economies with 70% of the world's renewable potential located in the Global South.

14. Monday vian John mary, TIP Fellow, Policy and Market Research, CEO spul foods, Uganda

It's quite understandable that all these responses and highlights can help the community to advance climate adaptation technologies and strengthening including attracting source of financing especially in low developed countries to enhance the well-being of community members.

15. Gnana Bharathi, Tamil Nadu, India

Here in Tamil Nadu many people with tetraplegia use handheld water sprinker to reduce body warmth. They keep it closer to their hand and sprinkle the water on their head and face as when they feel hot weather.

16. APCTT INPUTS 1

Dear Members,

Sharing a case study on citizen science flood-monitoring under the RISE program (Revitalising Informal Settlements and their Environments), ran across 13 informal settlements in Suva, Fiji, and Makassar, Indonesia, between 2018 and 2020 (Wolff et al., 2021).

The technology was simple: a flood gauge in each settlement, residents photographing water levels on their own phones and sharing them via



WhatsApp. Over two years, 26 community members sent more than 5,300 photos.

What made it work wasn't the tool, but what came before it. In Indonesia, the team had over a year of contact with the community before the project even began. And instead of introducing something new, they used WhatsApp, a platform people already opened every day. Ownership deepened once the exchange became two-way: in Makassar, contributors got monthly public recognition, and the same group started carrying flood warnings between residents, not just data reports back to RISE.

The barrier that nearly broke it wasn't cost, it was continuity. In Fiji, fieldworkers were spread thinner across more settlements, and the only compensation, prepaid data top-ups, sometimes lapsed mid-week, breaking reporting habits before they could form. In Indonesia, sharing flood photos was already a habit, so uptake stayed steady. Same gauge, same app, two different outcomes, and the only real variable was whether access and familiarity held up over time.

No green bond or blended finance here, just donor and multilateral research funding (Wellcome Trust, ADB, national aid agencies). The paper is candid that long-term continuation depends on a local institutional partner, pointing to Indonesia's disaster agencies as the realistic next home.

Reference: Wolff, E., French, M., Ilhamsyah, N., Sawailau, M. J., & Ramirez-Lovering, D. (2021). *Urban Planning*, 6(4).

[**Collaborating With Communities: Citizen Science Flood Monitoring in Urban Informal Settlements | Article | Urban**](#)

17. APCTT INPUTS 2

Dear members, many thanks for all the wonderful responses to the query. I wish to add a few points that have not come up so far.

1. SIDS and informal settlements

The query specifically names small island developing states (SIDS) and informal settlements, but we have not discussed this so far. According to the 2024 Lancet SIDS Report, Green Climate Fund (GCF) adaptation finance to Pacific SIDS averages around US\$70 million per country, against an International Monetary Fund (IMF) estimate of roughly US\$1 billion annually for Pacific SIDS alone. Across Eastern and Southeast Asia, UN-Habitat data put the number of people living in informal settlements at over 306 million. These are communities where land tenure insecurity and non-existent utility connections make most standard delivery models inapplicable.

2. On disability and who participates in co-design

Several members have rightly stressed community participation. A 2024 Lancet Planetary Health review of over 1,600 climate adaptation studies found that just 1% considered disability. Older people and people with disabilities are often most exposed to disasters, as acting on early warnings requires physical mobility. These are also the least likely to be present when technologies are chosen and tested. This seems worth factoring into what we mean by co-design.

3. On the structure of climate finance, not just its delivery

Members have pointed to slow disbursements and funds more difficult to access. There is a more difficult problem: a 2025 joint report by Oxfam and CARE found that much of the climate finance reaching the Global South comes as loans, with some countries now repaying more than they receive. The United Nations Environment Programme (UNEP) Adaptation Gap Report 2025 notes that adaptation captures only about a third of total climate finance, with aid budgets in several major donor countries falling further. The grant-versus-loan composition of climate finance probably deserves as much attention as the disbursement process.

4. On displacement and those who cannot move

According to data from the Internal Displacement Monitoring Centre (IDMC), Asia-Pacific recorded over 26 million climate displacements in 2023. The people hardest to reach through technology programmes are often



those who cannot relocate the elderly, people with disabilities, those without the resources that migration requires. When we discuss technology adoption and long-term maintenance, it is worth asking what happens to cooperative structures and service networks when a community is scattered by disaster.

A future query focused on informal settlement adaptation, or a deliberate effort to include Pacific Island practitioners, would help. As would a conversation on our community specifically on the financing structure question.

18. APCTT INPUTS 3

Dear members, based on the valuable inputs received so far, I have developed an infographic (AI generated) highlighting the key barriers to inclusive climate adaptation across the Asia-Pacific region. Click [here](#).



Many thanks to all who contributed to this query!

This Consolidated Reply is a systematic compilation of all responses received, and additional desk research compiled by CoP Moderating Team at APCTT. If you have further information to share on this topic, please send it at apctt.cop@un.org.

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