

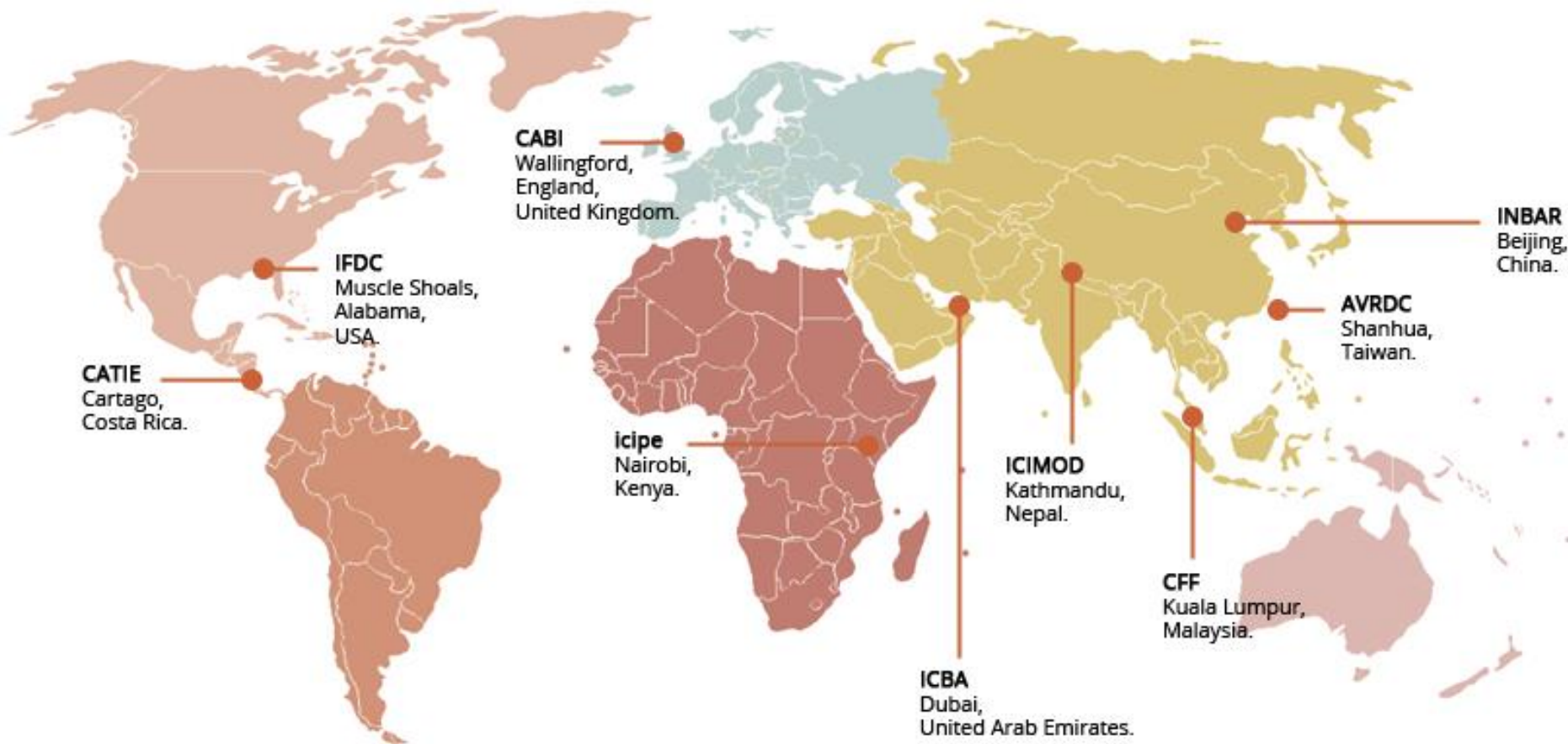
# GAPAD-AIRCA and SDG2: From Sustenance to complete Nourishment in a changing climate

By  
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With contributions from all AIRCA Centers



# AIRCA: A worldwide partnership



# AIRCA: A Broad Scope of Commitment to the SDGs

**SDG 17** Partnership for the Goals (All Centers)

**SDG 15** Life on Land (All Centers)

**SDG 13** Climate Action (IFDC, INBAR, CATIE, ICBA, *icipe*)

**SDG 12** Responsible Consumption and Production  
(AVRDC, CABI, CATIE, INBAR)

**SDG 11** Sustainable Cities and Communities (INBAR)

**SDG 8** Decent Work and Economic Growth  
(IFDC, CABI, *icipe*, CFF)

**SDG 7** Affordable Clean Energy (INBAR, CFF, ICIMOD)

**SDG 6** Clean water and Sanitation (ICBA, ICIMOD)

**SDG 2** Zero Hunger (All Centers)

**SDG 1** No Poverty (All Centers)



# Global Action Plan for Agricultural Diversification



**GAPAD**

**SDG1**

**Eradication of Poverty**

**SDG2 Zero Hunger**

**SDG7 Affordable and Clean Energy**

**SDG12 Responsible Consumption & Production**

**SDG13 Climate Action**

**SDG 15 Life on Land**

# UN SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

**Summary targets are given below:**

**They exclude targets a-c which are appropriate at state level only**

- **Shifting towards healthier diets;**

- Ensuring the supply of safe, nutritious food;
- Zero hidden hunger;
- Double productivity and incomes;
- Women's empowerment
- Strengthen capacity for climate change adaptation;
- Maintain the genetic diversity of seeds and genetic resources;

# Shifting towards healthier diets

Balanced diets



World Vegetable Center



# Shifting towards healthier diets

## CABI Strategic Objectives

## Priority Actions

Increasing food & nutrition security by bringing science from the lab to the field

**Nutritional Quality: Promote agricultural diversification** and the use of indigenous crops and **support nutrition sensitive agriculture** through awareness raising, policy development, food / diet advice and information on food preparation, nutraceuticals and bio-fortification

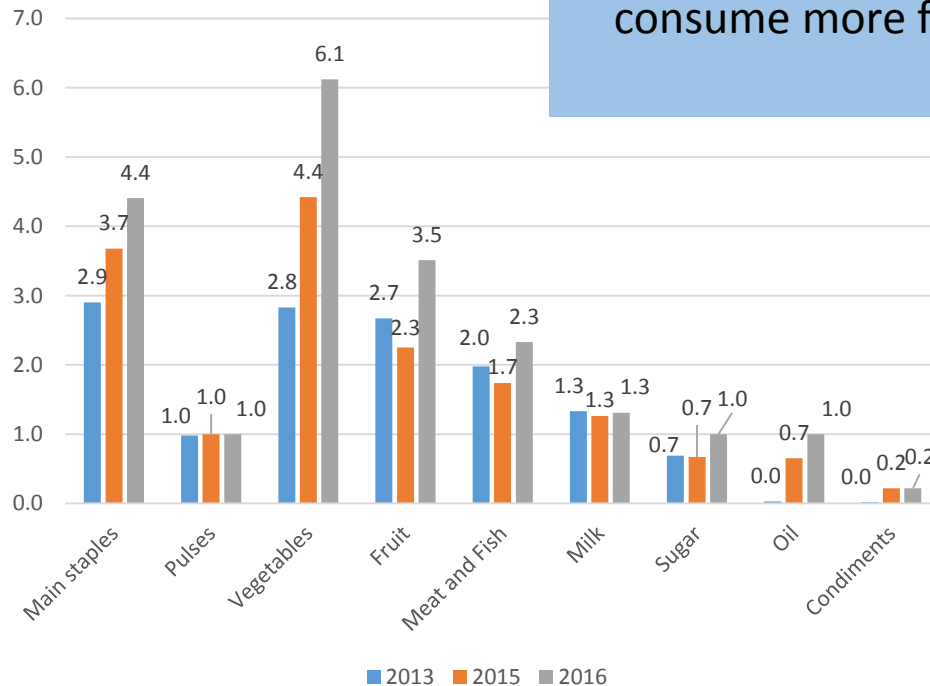


## CATIE's Programa Agroambiental Mesoamericano (MAP)

Data from MAP's Monitoring and Evaluation System shows:

- Thousands of families have diversified their diet by increasing the number of food groups they consume as well as the average number of foodstuffs they consume
- They have also increased their saving capacity since they consume more foods produced in their farms

Average number of different foods consumed per food group



Programa Agroambiental  
Mesoamericano (MAP)



## ICBA is diversifying crop production in marginal environments to promote nutritional and environmental resilience

Quinoa



Salicornia



# Shifting towards healthier diets

CFF is improving food quality, processing, functionality & nutritional value



*Moringa oleifera*



Bambara groundnut



Ambarella fruit



# UN SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

- Shifting towards healthier diets;
- **Ensuring the supply of safe, nutritious food;**
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## *Ensuring the supply of safe, nutritious food*

In 30 countries, IFDC's core activities address SDG 2, tapping into the **transformative power of agriculture to increase food security and ultimately better the lives** of millions of people, from agribusiness dealers to smallholder farmers.

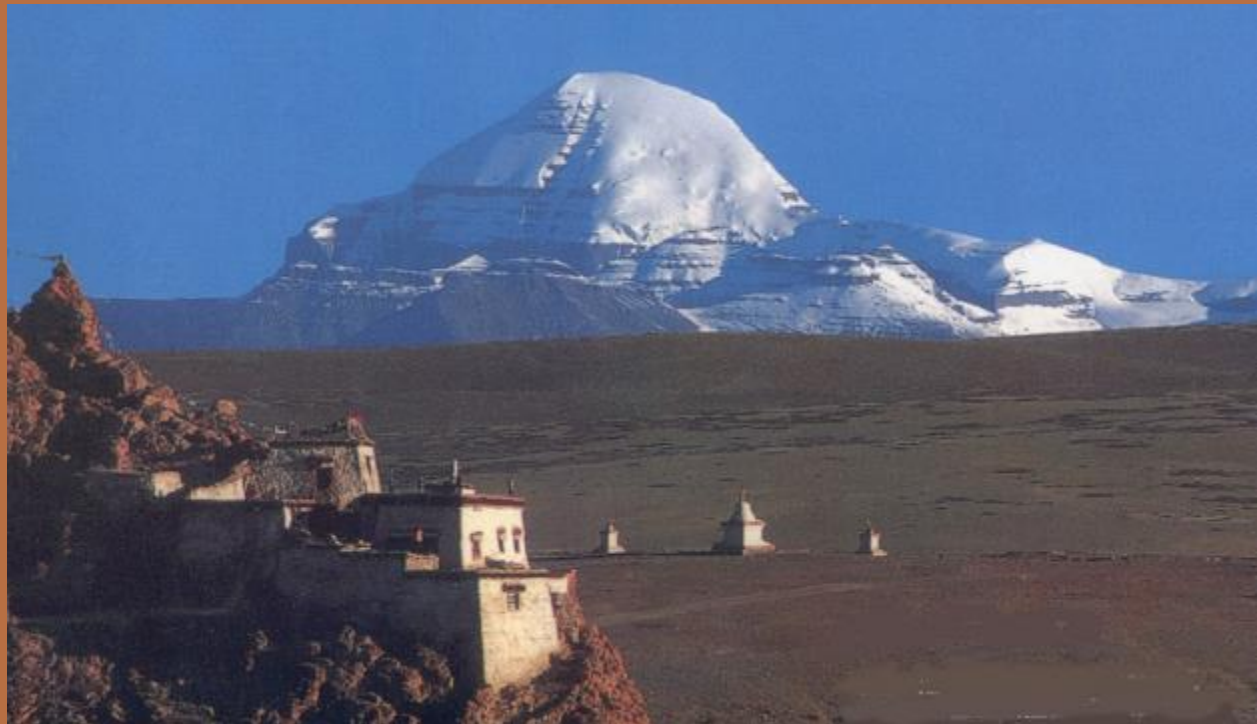




## ICIMOD and SDG2: A Multi-pronged Approach

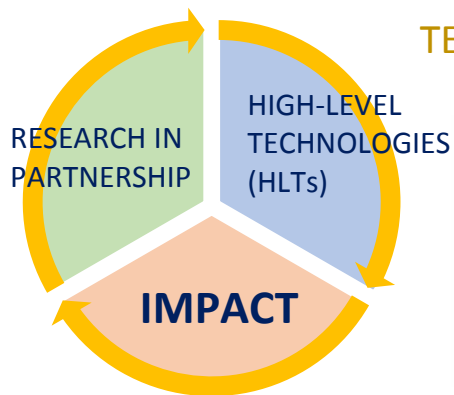
ICIMOD's approach entails:

- Diversifying agriculture
- Promoting sustainable use of land, water, forest, rangeland
- Promoting non-farm income
- Increasing access to water and energy for productive & domestic uses



# Ensuring the supply of safe, nutritious food

## WORLD VEGETABLE CENTER TECHNOLOGIES TO END HUNGER AND MALNUTRITION



### Bring technologies to SCALE

- Strengthen capacity (women, youth)
- Innovative financing
- Input/output markets
- Knowledge management
- Policy environment

### SEED

Collect, conserve and share **vegetable genetic resources** worldwide



- **IMPROVED VARIETIES**
- **PROTECTED CULTIVATION**
- **GRAFTING**

### BREED

Develop **climate-resilient and nutritious vegetables** with pest and disease resistance; tolerance to heat, drought, flooding, and salinity; increased shelf life



- **INTEGRATED PEST MANAGEMENT**
- **POSTHARVEST HANDLING**
- **PROCESSING**

### FEED

Develop and deploy **sustainable production, processing and distribution methods** to increase farmer **incomes** and provide **nutritious and safe vegetables** for consumers



- **NUTRITION KNOWLEDGE**
- **HOUSEHOLD GARDENS**
- **MARKET VALUE WEBS**

### LEAD

Public-private and community **partnerships** to engage, adopt, adapt technologies in **learning sites** and **out-scale HLTs** for **impact** on **food security** and **safety**



World Vegetable Center



## CABI Strategic Objectives

## Priority Actions

Increasing food & nutrition security by bringing science from the lab to the field



Combating invasive weeds!

### Food Supply

**Strengthen capacity of plant health** systems to reduce pre- and post-harvest losses

**Build robust seed systems**, including improved genetic materials, availability of neglected crops, and improving self-saved seeds

**Enhance access** to quality controlled agricultural inputs (seeds, fertilizers, chemicals)

**Support** extension services to enable farmers to make informed decisions at farm level



## Insects for Food and Feed



Growing global demand for animal protein:  
Insects can be used as food or as a feed for other livestock such as chicken and fish.

2 billion people eat more than 2K insect spp.

Insects can improve food and nutritional security with high fat, protein, vitamin, fibre & mineral content

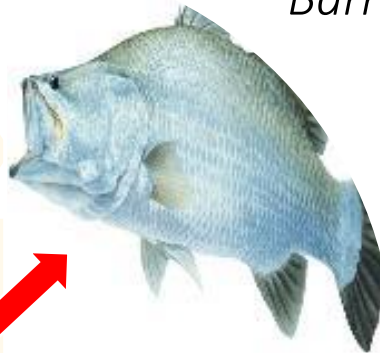
eg. African Emperor Caterpillar has 72% protein compared to 60% in fish meal.

## **Insects and Underutilised Crops for Fish feed**

*Sesbania*



*Barramundi*



### **Disruptive innovation**

- Wealth generation
- Sustainable aquaculture
- Environmental security

*Black soldier fly larvae*



*Moringa*



# UN SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

- Shifting towards healthier diets;
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## • **Zero hidden hunger;**

- Double productivity and incomes;
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- Strengthen capacity for climate change adaptation;
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# Zero Hidden Hunger

## HOW CAN WE GET PEOPLE TO EAT MORE FRUIT & VEGETABLES

200 g of each, daily =

- ✓ more **nutritious** diets
- ✓ **healthier** children and adults
- ✓ more **resilient** individuals and households

The World Vegetable Center promotes vegetable **consumption** through

- Home and school gardens
- Recipes
- Food processing training

### Nutrients in vegetables

- Improve children's ability to grow and learn
- Improve adults' capacity to work and earn

HOW MUCH IS  
400 GRAMS?



**World Vegetable Center**



RAW



COOKED



# Zero Hidden Hunger

Shift the Focus from hunger to encouraging people to take up healthier, better balanced diets

- **“Globesity”** (WHO): Global epidemic of excess weight and obesity is increasingly becoming a major public health problem
- Southeast Asia and western Pacific region is at the forefront of this crisis



India and PR China: Rapid growth rate of obesity and type 2 diabetes amongst children



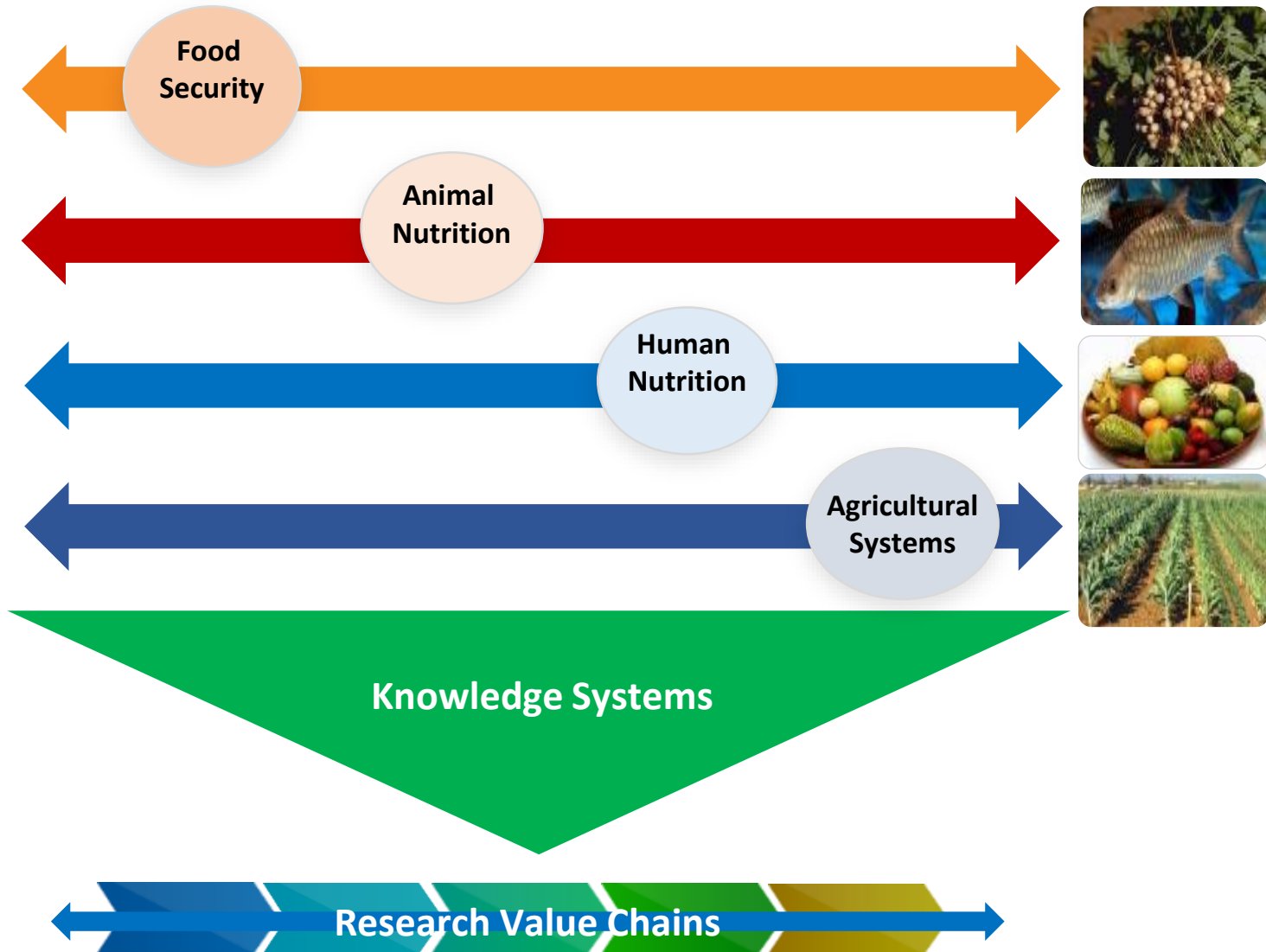
**World Vegetable Center**



# Zero Hidden Hunger

## CFF - Research Programmes and Activities:

Building 'Research Value Chains' on underutilised crops



# ICBA Contributes to Food and Nutrition Security and Environmental Sustainability in Marginal Environments by Diversifying Production



Salt tolerant millet and sorghum

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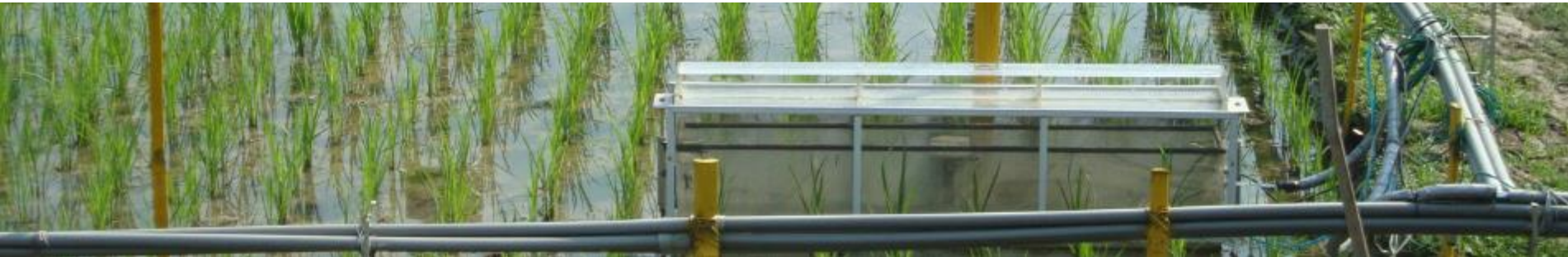
## *Double Productivity and Incomes*

50% of the world's food is a direct result of fertilizer application.

But smallholder farmers, who grow 80% of food consumed in developing nations, often lack access to affordable, appropriate fertilizers.



IFDC work ties the research for new products and processes with the practical means of affordably delivering those products to farmers who are trained to use them effectively and economically.





# Double Productivity and Incomes

IFDC increases agricultural productivity and farm profitability through:



## Fruit Fly IPM

### Fruit flies

- Annual loss of US\$2 billion in Africa
- Quarantine restrictions results in loss of trade
- Heavy reliance on synthetics chemicals for control which in turn leads to human and environmental health issues and further trade restrictions.

### Fruit Fly IPM

- Integrate package of Biopesticides (Real IPM), natural enemies, orchard sanitization, bait spray (Kenya Biologics) and Post harvest treatment.





## Integrated pest management

The impact of insects on crops is routinely controlled using insecticides.

- Insecticide residues; with holding periods, market access
- Insecticide resistance

Biopesticides; natural predators entopathogenic fungi

- IPM strategies for a range of major crop pests

*icipe* and Real IPM developed biopesticides: Products are registered in South Africa, Kenya, Tanzania, Ethiopia and Ghana

## INBAR Project Impact – Farmer Livelihood

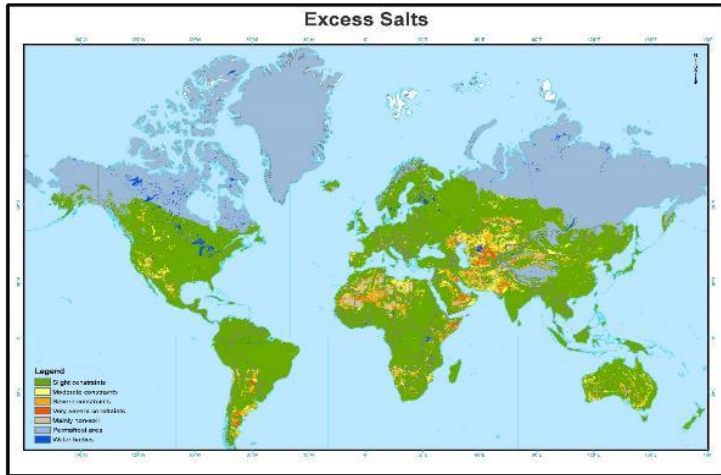
Bamboo is able to sequester carbon at rates comparable to many tree species. It also supports poverty alleviation and opportunities for improving livelihoods.

In Guizhou province, China:-

- Yield increased to approx. 350 kg of bamboo shoots per mu (1 mu = 1/15<sup>th</sup> of hectare)
- Possibility to increase yield further up to a maximum of 1000 kg per mu
- Farmers on an average can earn 8,000 RMB per mu with an optimal management program



# Double Productivity and Incomes



ICBA Contributes to increasing productivity and incomes in Marginal Environments by Diversifying Production to better manage saline environments

ICBA Contributes to increasing productivity and incomes in Marginal Environments by using or re-using low-quality water for crop production



## Diversification of Mountain Agriculture

Agriculture is the main source of livelihood in the HKH region. ICIMOD promotes risk-averting, risk-spreading strategies in agriculture by:

- promoting high value cash crops and niche mountain products: fruits, vegetables, nuts, honey, medicinal herbs, and farm animals like yak, goats, and sheep
- training farmers in vegetable and horticulture production, small-scale farm business management and skills development
- improving management practices of agro-pastoral systems and improving animal husbandry of pastoral systems





## Market chains strengthened and made more equitable

### Processing industries

Linking vegetable production to the processing industry will increase the demand and eventually the production and consumption of vegetables



Fresh supermarket, India



Darsh industries produces ketchup and tomato paste in Tanzania



Salad market, Uzbekistan



# UN SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture

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- Strengthen capacity for climate change adaptation;
- Maintain the genetic diversity of seeds and genetic resources;



# Empowering women and promoting gender sensitive interventions

**Gender transformative changes are practiced by ICIMOD including:**

- Insisting on gender differentiated data and results in our and partners' works
- Conscious effort to integrate women into climate change research and adaptation
- Training women's groups in productive use of remittances



# Women's Empowerment

**CATIE promotes the sustainable intensification/ diversification of agricultural production and linkages of smallholders to markets for enhanced food security.**

**The Mesoamerican Agro-environmental Program** links research, education, and technical assistance and strongly fosters equal participation of women and youth in decision-making





## **Womens' empowerment by the World Vegetable Center**

Impact of training women in home gardening and nutrition in Bangladesh

### **Interventions included:**

- Training in home gardening and nutrition
- Mini-seed packs of 7 nutrient-dense vegetables
- Regular follow-up
- The intervention was implemented by the NGOs BRAC and Proshika



## Womens' empowerment by the World Vegetable Center

Impact of women's training in home gardening and nutrition in Bangladesh

Outcome indicator	Baseline		Follow-up		Impact
	Control	Interv.	Control	Interv.	
Home garden production (kg/yr)	86	85	79	109	31 (p<0.01)
Home garden consumption (kg/yr)	53	48	60	82	28 (p<0.01)

→ Garden supply of iron, folate, zinc and protein +80-95%, supply of vitamin A and calcium +135%, supply of vitamin C +175%.

→ Analysis also showed the intervention to be cost-effective in abating iron, vitamin A and zinc deficiencies.

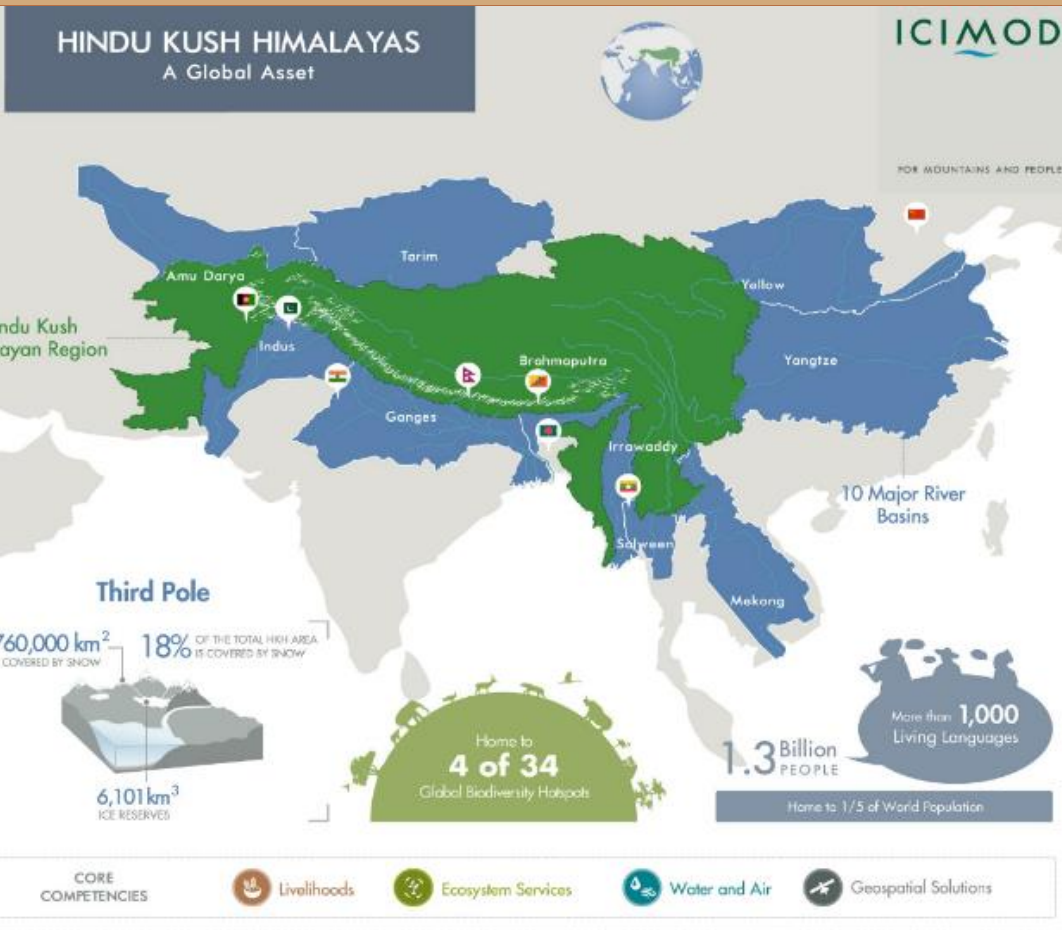




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## Climate Change in the Hindu Kush- Himalayas



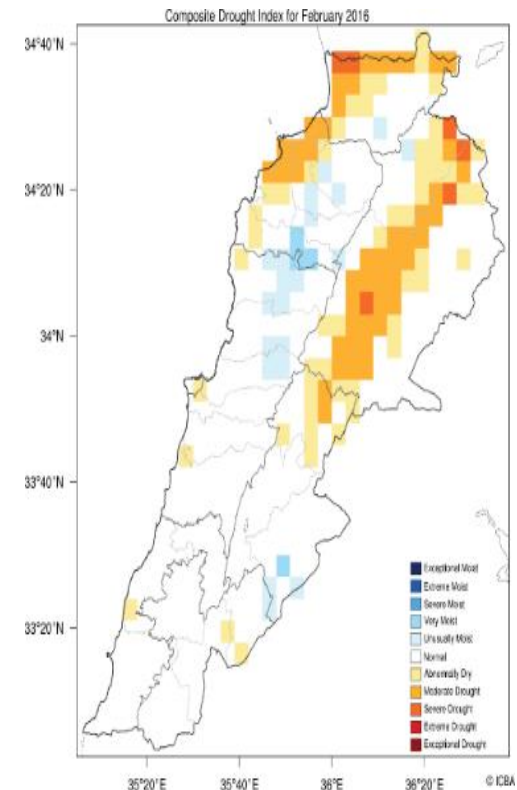
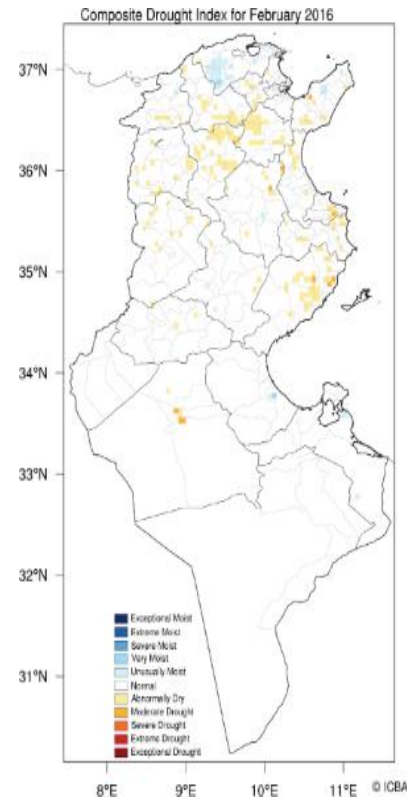
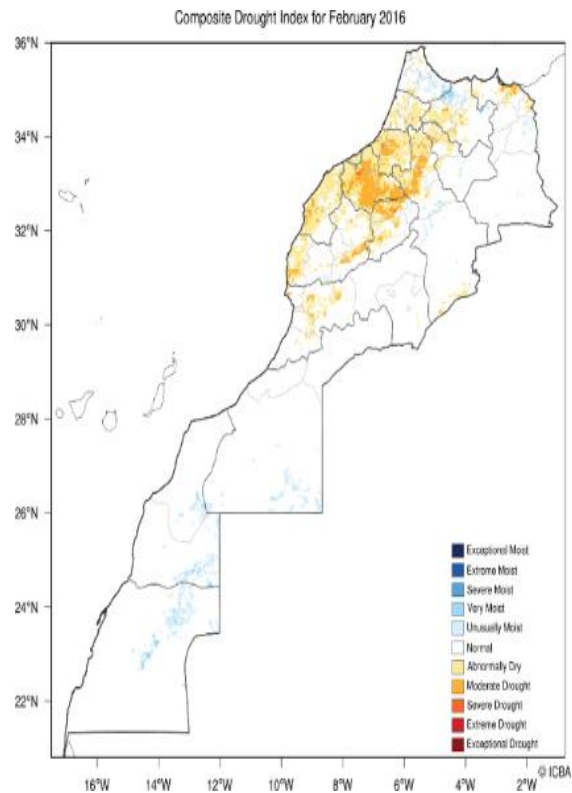
### HKH faces serious threat from climate change and other drivers of change:

- Retreating glaciers / changing ecosystem / changing monsoon patterns & extreme events
- Incidence of disasters (especially water-induced) on the rise / outmigration, mostly men
- Increasing black carbon / decreasing crop yields

# Strengthen capacity for climate change adaptation

## Developing resilient agriculture and increasing production

Integrated drought monitoring and mitigation planning ensures extreme events are more effectively managed – today and under climate change



**Morocco, Tunisia and Lebanon**

# Strengthen capacity for climate change adaptation

*Supporting farmers, stakeholders and agencies to plan and deliver innovative solutions to climate change along the value chain*



- **Diverse Crop Options**
- **Climate & Soil Suitability**
- **Commercial Potential**



- **Simple**
- **Timely**
- **Local**



- **High value**
- **Cost effective**
- **Future proofed**



**CATIE promotes the sustainable intensification/ diversification of agriculture production and linkages of smallholders to markets for enhanced food security.**

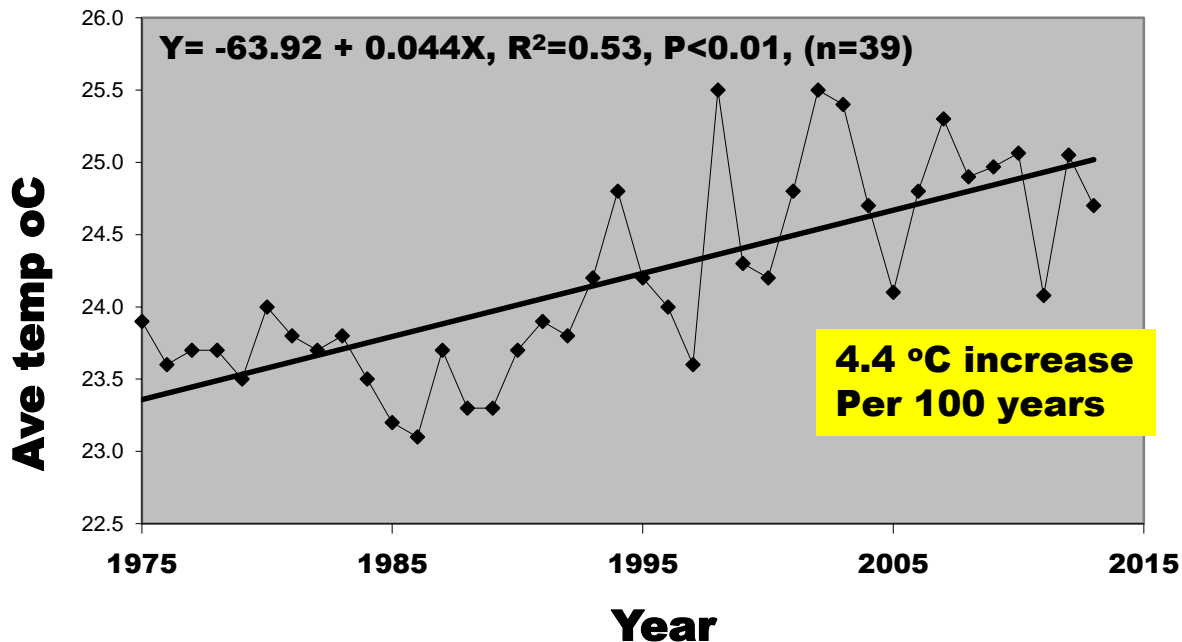


**The Mesoamerican Agroenvironmental Program** is a platform that links research, education, and technical assistance which Strengthens territorial management to deal with climate variability and change

## Prepare for Global Warming Now!

2025 is only one breeding, production and distribution cycle away

**Annual average air temperature AVRDC, Shanhua  
1975-2013**

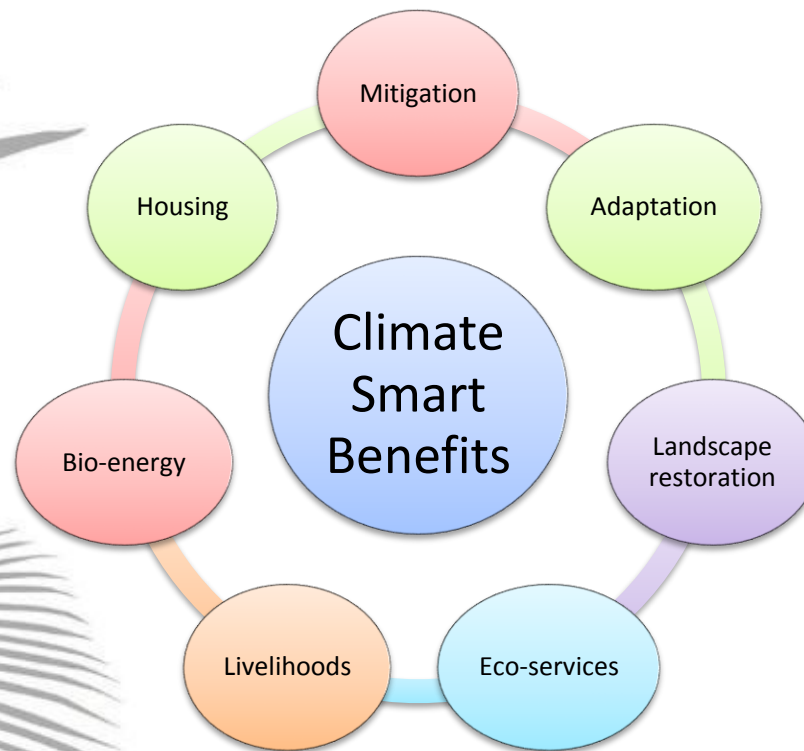


**Worse insect  
& plant  
disease  
effects are  
coming!**



## Bamboo & Climate Change

Bamboo is a strategic resource that offers many countries a wealth of practical solutions to climate change. It contributes to mitigation, adaptation and development to climate change, is easy to adopt, and brings a multitude of benefits, which include:

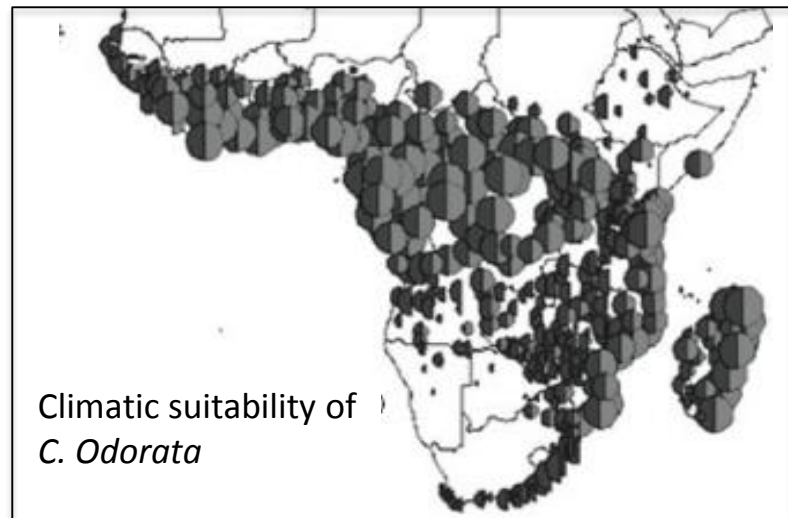


- *Absorbing and storing carbon*
- *Protecting and restoring degraded lands and watersheds*
- *Insulating environments against extremes of weather*
- *Providing low-cost, green housing and infrastructure*
- *Providing a range of biofuels*
- *Supplying a renewable, sustainable resource for generating income*
- *Increasing the sustainability, range and season of food sources.*





# Higher temperatures and CO<sub>2</sub> levels could easily exacerbate alien and parasitic weed invasions in Africa





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# Maintain the genetic diversity of seeds and genetic resources

**CATIE promotes the sustainable intensification/ diversification of agriculture production and linkages of smallholders to markets for enhanced food security.**

**The Mesoamerican Agroenvironmental Program links research, education, and technical assistance and:-**

Advances the sustainable use of agrobiodiversity through the establishment of germplasm/seed banks, and local mechanisms for germplasm exchange



Programa Agroambiental  
Mesoamericano (MAP)



# Maintain genetic diversity

World Vegetable Center uses its unique genebank for screening new rootstock options for use in disease and insect control through grafting



Bacterial wilt  
Fusarium wilt  
Root-knot  
nematode  
Flooding

EG195



HW7996



Screening for Salt Tolerance of *Solanum pimpinellifolium*

AVRDC GeneBank: Potential rootstock collection

- Eggplant: 3,713
- Tomato: 8,259
- Pepper: 8,235



World Vegetable Center



*Solanum aethiopicum*



*Solanum mammosum*



*Solanum sisymbriifolium*



*Solanum torvum*



## Bamboo Shoots in China

- **Species:** More than 500 bamboo species are distributed in 16 provinces. 200+ bamboo species have edible shoots.
- **Output:** Output of the bamboo shoot industry was about 166 million tonnes in 2011.
- **Value:** Value of the bamboo shoot industry is currently about \$1.9 billion/yr. Export earnings reached about \$220 million - 60% of the world's total.)





## Benefiting from insects

**Pollination services:** 70% of crops rely on pollination services and not all pollinators are equal.

**Bee Health:** protecting pollination services

- Mapping the presence and diversity of bee pathogens
- Breeding for disease resistant bees
- Creating and supporting a network of bee health labs across Africa



### **Maintaining the unique genetic diversity of salt tolerant seeds and plants**

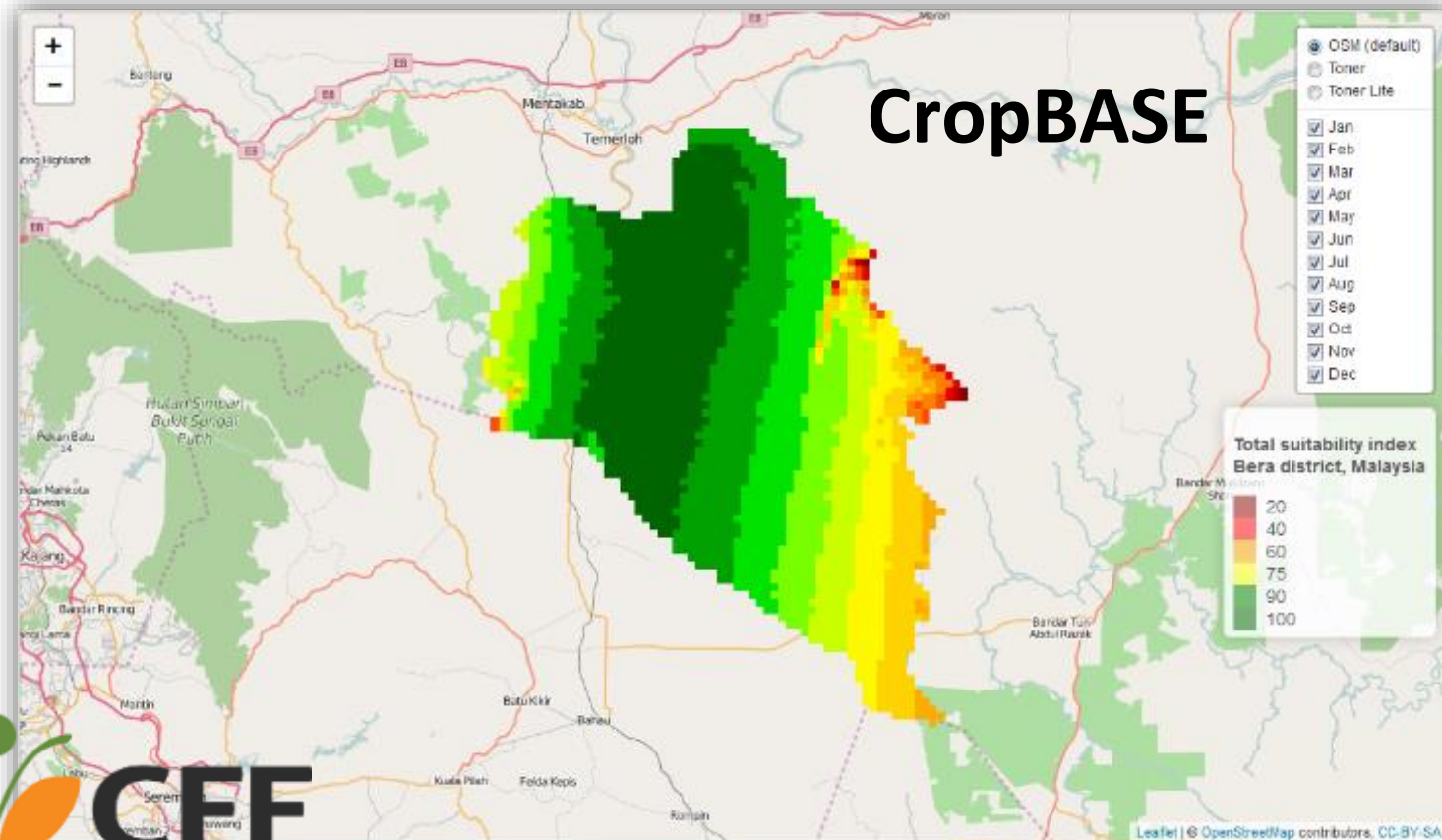
ICBA's Genebank is unique and seed is shared with multiple partners from disadvantaged environments globally

Resilient agriculture needs non-conventional crop options such as saline tolerant species as there are many environments in the developing world disadvantaged by salinity



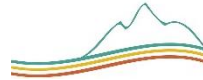
# Maintain genetic diversity

## CropBASE: Global knowledge products from big data

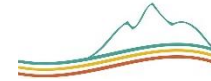


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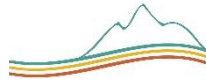
Shifting towards healthier diets



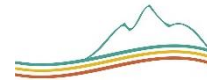
Ensuring the supply of safe, nutritious food



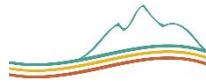
Zero hidden hunger



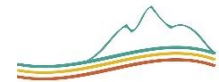
Double productivity and incomes



Women's empowerment



Strengthen capacity for climate change adaptation



Maintain the genetic diversity of seeds and genetic resources

