INTEGRATION OF INDIGENOUS KNOWLEDGE SYSTEMS IN CLIMATE CHANGE ADAPTATION AND ENHANCING FOOD SECURITY IN NANDI AND KEIYO DISTRICTS, KENYA

Published as

Experiences of Climate Change Adaptation in Africa, Climate Change Management, pp:69-95, DOI:10.1007/978-3-642-22315-0_5

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Workshop on Adapting to Climate Change in Coastal Dar es Salaam

6th – 8th June 2011.

Presentation Outline

- Introduction
  - ✓ Rationale of the problem
  - ✓ Objectives of the study
- Materials and methods
  - ✓ Study area
  - ✓ Research design and sampling technique
- Results and discussion
- Conclusion and recommendations

Introduction

General

- Expected variations in the frequency, intensity and persistence of climatic extremes are key determinants of future impacts on crop productivity and vulnerability to food insecurity in Sub-Saharan Africa.

- More erratic and irregular rainfall patterns, shorter growing seasons, prolonged intra-seasonal and inter-seasonal dry spells, increased drought events will exert devastating effects on rain fed subsistence systems.

- **Impacts**: decreased crop yields; severe disruption/destruction of livelihood opportunities; increase local/global food prices; and exacerbate household vulnerability to food insecurity (FAO, 2006).

- Where a combination of slow climatic changes and increasing frequency of sudden shocks occur (ASALs), could trigger much larger and more frequent harvest collapses than communities can cope with (Kipkorir et al., 2002; IPCC, 2007)

Introduction cont…….

Rationale of the problem

- For most subsistence households in Nandi and Keiyo districts, access to modern techniques for climate change adaptation (CCA) and food security enhancement are beyond their economic reach.

- Thus, Indigenous Knowledge systems (IKS) constitutes an invaluable, diversified, cost-effective, dynamic & localized resource that has enabled them to survive and produce under risks, without exposing themselves to more risks or shifting towards mal-adaptation.

- However, even as the importance of IKS in climate forecasting, crop production and food security is replete in scientific literature and is gaining prominence in CCA debate, this technology is not readily acceptable and integrated with modern scientific techniques.

Introduction cont…….

Objectives of the study

1. To identify and document the IKS practices/technologies related to climate change adaptation, crop production and food security;
2. To assess the role, reliability and use of IKS in household food security and CCA;
3. Identify opportunities for integrating IKS with modern strategies in enhancing CCA and food insecurity risk reduction

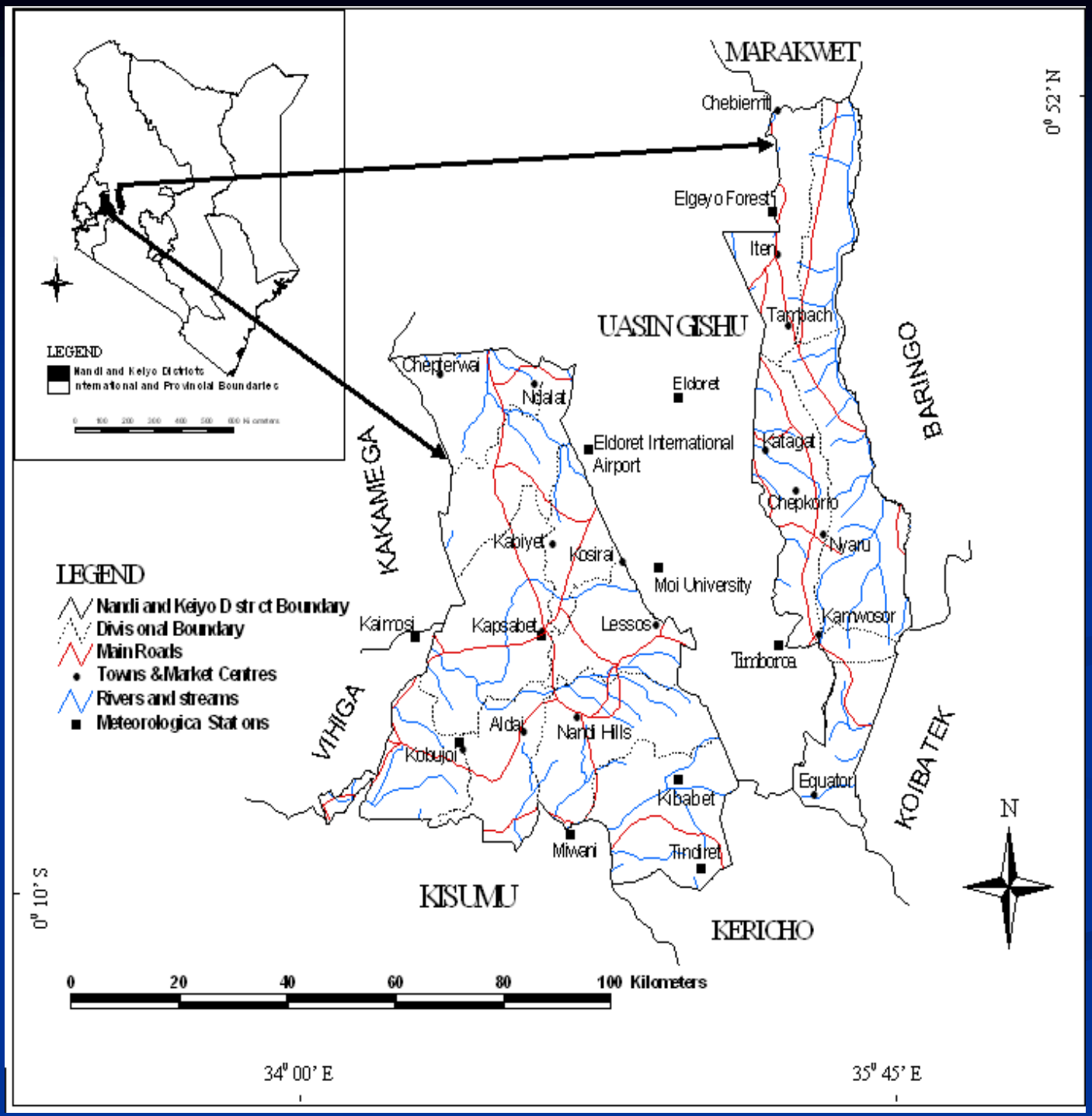
Study Area

KEIYO DISTRICT

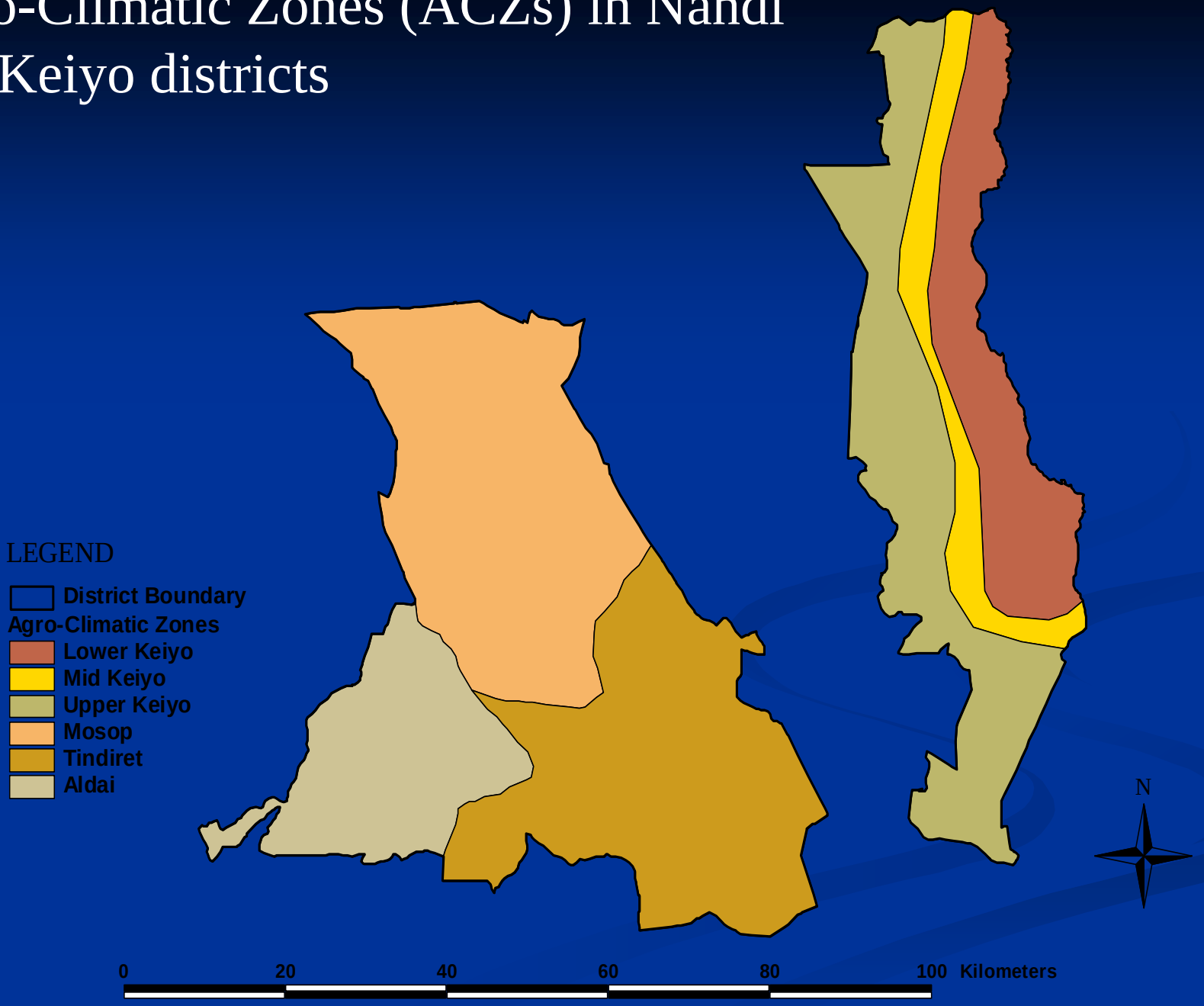
- Location and size: 0^0 10' to 0^0 52' N and 35^0 25' to 35^0 45' E; Area: 1450 km^2.
- Topography: 1000 m a.sl (Kerio valley) to over 2500 m a.s.l at the peak of the Elgeyo/Marakwet escarpment (Highlands).
- Climate: Temperature: varies between 22^0C-31^0C (Kerio Valley) & 13^0C-21^0C (highlands), average rainfall (700-1000mm in valley & 1700mm (highlands)
- Main livelihood sources: On-farm (cereal & legume production; horticulture and livestock) and off-farm (formal employment, business, casual/wage employment).

NANDI DISTRICT

- Location and size: 0^0 14' - 0^0 35' N and 35^0 00' to 35^0 25' E; area: 2880 km^2.
- Topography: fairly high relief (1500-2300 m a.s.l.)
- Climate: cool and moderately wet; mean annual rainfall ranges between 1200-2000 mm and mean monthly temperatures of 18-22 ^{0}C.
- Main livelihood sources: diverse agricultural crops (cash, food and fruit) and dairy farming), commerce, trade and services, agro-based industries for tea and milk processing.


MARAKWET
Chebiemit
Elgeyo Forest
Iten
Tambach
UASIN GISHU
BARINGO
Chepterwai
Ndalat
Eldoret
Eldoret International Airport
Kataget
KAKAMEGA
Chepkorio
Kabiyet
Kosirai
Nyaru
Moi University
Kamwosor
Kaimosi
Kapsabet
Lessos
Timboroa
VIHIGA
Aldai
Nandi Hills
Kobujoi
Equator
KOIBATEK
Kibabet
Tindiret
Miwani
KISUMU
KERICHO
LEGEND
Nandi and Keiyo District Boundary
Divisional Boundary
Main Roads
Towns &Market Centres
Rivers and streams
Meteorological Stations
0 20 40 60 80 100 Kilometers
N
0° 52' N
0° 10' S
34° 00' E
35° 45' E

Agro-Climatic Zones (ACZs) in Nandi and Keiyo districts



Materials and methods

Research design

Participatory Rural Appraisal (PRA)

- ✓ Comprising organized FGDs
- ✓ Household questionnaire survey and
- ✓ In-depth interviews with key informants and traditional sages

Table 1: Distribution of sampled HHs

District	Agro-climatic zone	HHs
Keiyo	Lower (Semi-Arid)	40
	Mid (Transitional)	87
	Upper (Humid)	90
Nandi	Mosop (Sub-Humidl)	85
	Tindiret (Humid)	68
	Aldai (Humid)	36
Total		**406**

Results and Discussion

Household demographics and livelihood activities

Variable	Category	Lower Keiyo	Mid Keiyo	Upper Keiyo	Mosop	Tindiret	Aldai
		%	%	%	%	%	%
Gender of Household Head	Male	80.0	81.6	80.0	73.2	78.6	55.6
	Female	20.0	18.4	20.0	26.8	21.4	**44.4**
Family Size	< 5	38.0	56.3	25.4	35.3	57.4	40.2
	6-10	42.5	37.2	62.3	59.3	39.7	53.1
	10-15	**17.0**	4.4	**12.3**	6.4	2.9	3.7
	> 16	**2.5**	**3.1**	**1.0**			**4.0**
Age Distribution	0-10	90.0	71.3	75.6	64.6	80.1	61.1
	11-20	72.5	72.4	82.2	68.9	85.8	72.3
	21-30	55.0	62.1	72.2	78.4	72.7	66.7
	31-40	37.5	45.9	55.5	77.9	60.2	44.4
	> 40	12.5	32.2	61.1	74.1	70.8	61.2
Education Levels of household members	Primary	88.0	88.0	79.0	89.0	96.0	94.0
	Secondary	25.0	54	74.0	72.0	59.0	53.0
	Post-Sec.	3.0	7.0	28.0	18.0	6.0	6.0
	Diploma	2.5	12.6	27.8	25.9	7.4	5.56
	University		2.3	16. 7	8.24	1.5	5.56

Results and Discussion

Livelihood source	Lower Keiyo	Mid-Keiyo	Upper Keiyo	Mosop Nandi	Tindiret Nandi	Aldai Nandi
Production and sale of food crops	10.0	35.6	**80.0**	**75.4**	**52.5**	**80.6**
Production and sale of cash crops	7.5	3.4	15.5	15.7	**41.1**	**55.5**
Production and sale of animals/products	**85.0**	11.4	43.3	**55.7**	**44.8**	25.0
Trade	47.5	36.7	36.6	44.3	9.6	13.9
Agricultural wage labour	**77.5**	18.3	33.4	37.0	39.2	11.2
Self-employment	22.5	14.9	36.6	37.7	23.5	8.4
Salaried employment	5.0	13.8	22.2	31.4	7.6	8.3
Pension		1.1	1.1	4.9	2.1	2.8
Informal mining	**27.5**	8.0	1.1	4.4	2.3	3.8
Charcoal burning	**57.5**	4.6	18.9	6.0		2.8
Other sources	37.5	2.3	2.2		4.2	2.8
	N=40	**N=87**	**N=90**	**N=85**	**N=68**	**N=36**

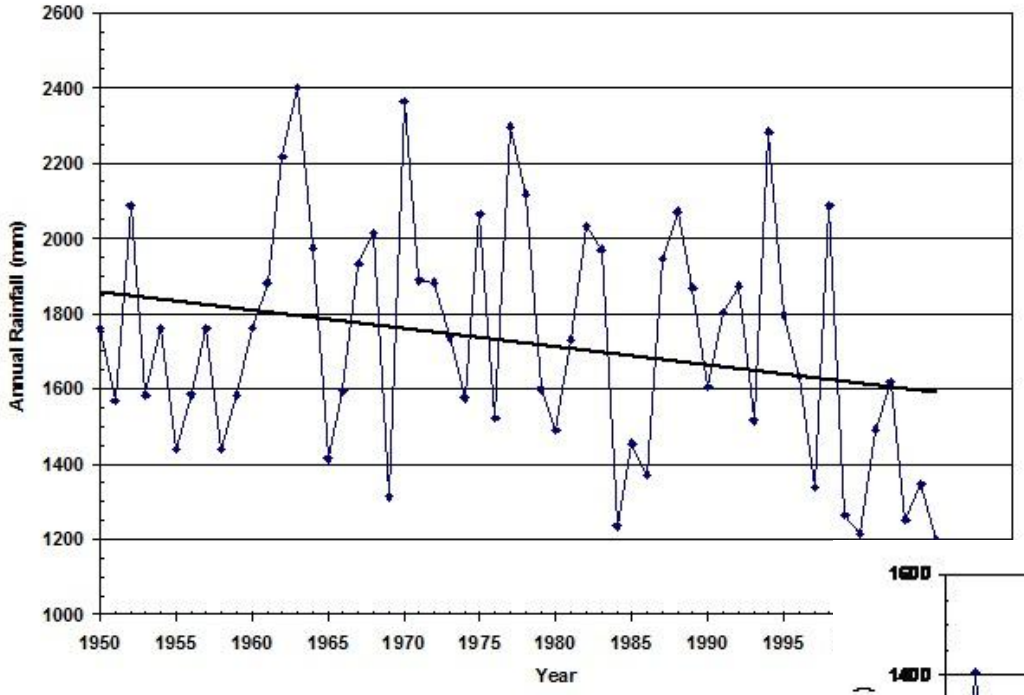
Results and discussion Cont….

- Below 20 years (children, school-going or drop-outs) HH members, average family size (6-10), limited access & control of women to productive use of land, increases dependency, strains limited food resources, affect school attendance & potentially increases poverty.

- Over reliance on income sources, exposed to weather risks and seasonal climatic variations (*Aldai & Lower Keiyo*) is a key indicator of vulnerability to food insecurity.

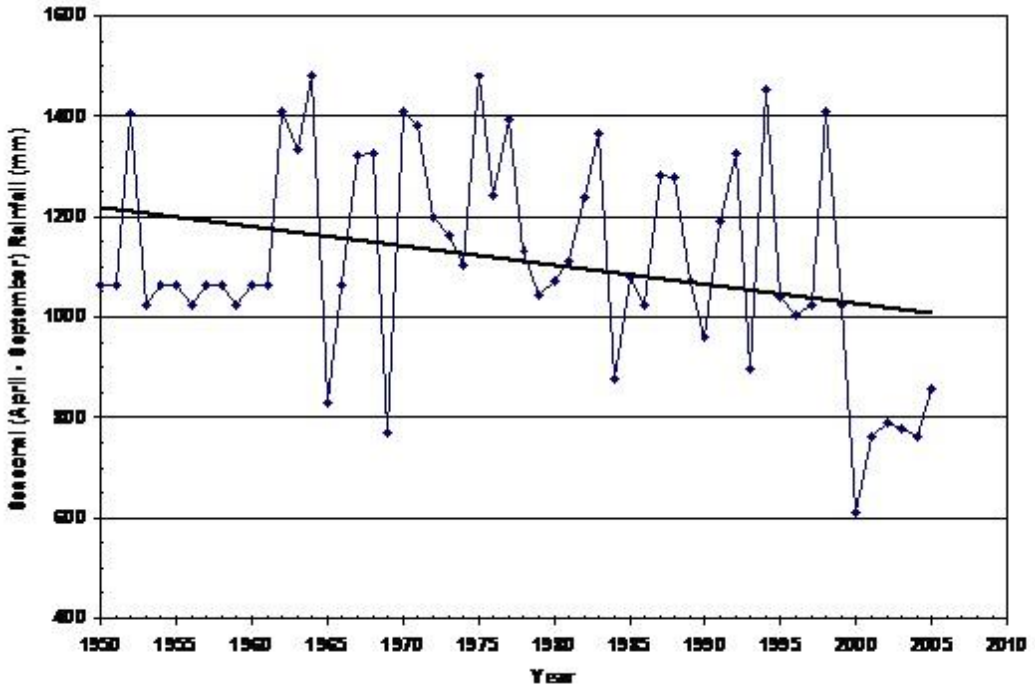
- Diversified livelihood sources (*Upper Keiyo, Mosop and Tindiret)* such as production and sale of food crops (*cereals, legumes and vegetables*), cash crops (*tea and coffee*), animal products (*beef and dairy*) & *trade*, guarantees relatively stable household incomes & provides alternative strategies for food security risk management, during times of scarcity.

Rainfall trends in selected station



Annual rainfall for Tinderet rainfall statio

Seasonal rainfall (April - September) for Tinderet rainfall station (1950–2005)



Results and Discussion

Common shocks affecting HH food security	Rank
1. Bad climate resulting in poor crop yields and harvest	1
2. High food prices	1
3. Natural disasters such as floods, droughts, pest infestations	1
4. Sickness of household head or increase in health expenditure	1
5. Death of household member or head	1
6. Loss of employment or reduced salary of dependable household head or member	1
7. High fuel and transport costs	2
8. High house rentals frequently reviewed, pegged in forex	2
9. Debt to reimburse	2
10. Irregular and unsafe drinking water	2
11. Electricity cuts	3
12. Insecurity and thefts	3
13. Frequent school fees (tuition and boarding) reviews	3

Results and Discussion

Implications:

- Household livelihood security encompasses food security, freedom from all dimensions of household poverty and ability to survive crisis and shocks (e.g sickness, accidents, natural disasters, financial crisis and household food insecurity).

- Level of education of the HHH determines the ability of the HH to acquire new skills and knowledge needed to boost food production, improve HH incomes and invariably enable the households to acquire an adequate food supply.

- Low HHH education level *(Lower Keiyo & Aldai)* influence the HH vulnerability to food insecurity by lowering productive capacity, ability to acquire the new & innovative skills and knowledge needed for food production, limits income diversification options & reduces ability to meet contingencies. Diverse livelihoods, even when exposed to climate risks, are averse to food and income insecurity.

HH strategies for CCA and food security risk reduction

Some coping strategies:

- Skip entire day without a meal, Lower Keiyo (22.5%) and Aldai (22.2%)
- Limit/reduce the portion of meals taken. (> 30% of all HHs)
- Reduce the number of meals eaten in a week (33% of all HHs)
- Send members to borrow food (*kesumet*) from friends & relatives
- Sharing livestock with relatives (*Kamanagtaet* or *Kimanagta)*

Production and storage:

- Traditional Ecological Knowledge (predicting rainfall on-set, seasons of droughts, timing of sowing etc).
- Change of crop varieties and techniques - re-introduction of early maturing crops (*finger millet* and *sorghum*), traditional vegetables (*spider plant, black nightshade , amarunth , pig weed, jute Mallow, pumpkin leaves* and) , cowpeas & improved maize varieties.
- Mixed farming, intercropping & small-scale irrigation.
- Seed banking (*millet, sorghum and maize*)
- Improved traditional granary (Aldai & Tindiret) for storing millet and sorghum crop.
- Rainwater harvesting techniques (using local resources)

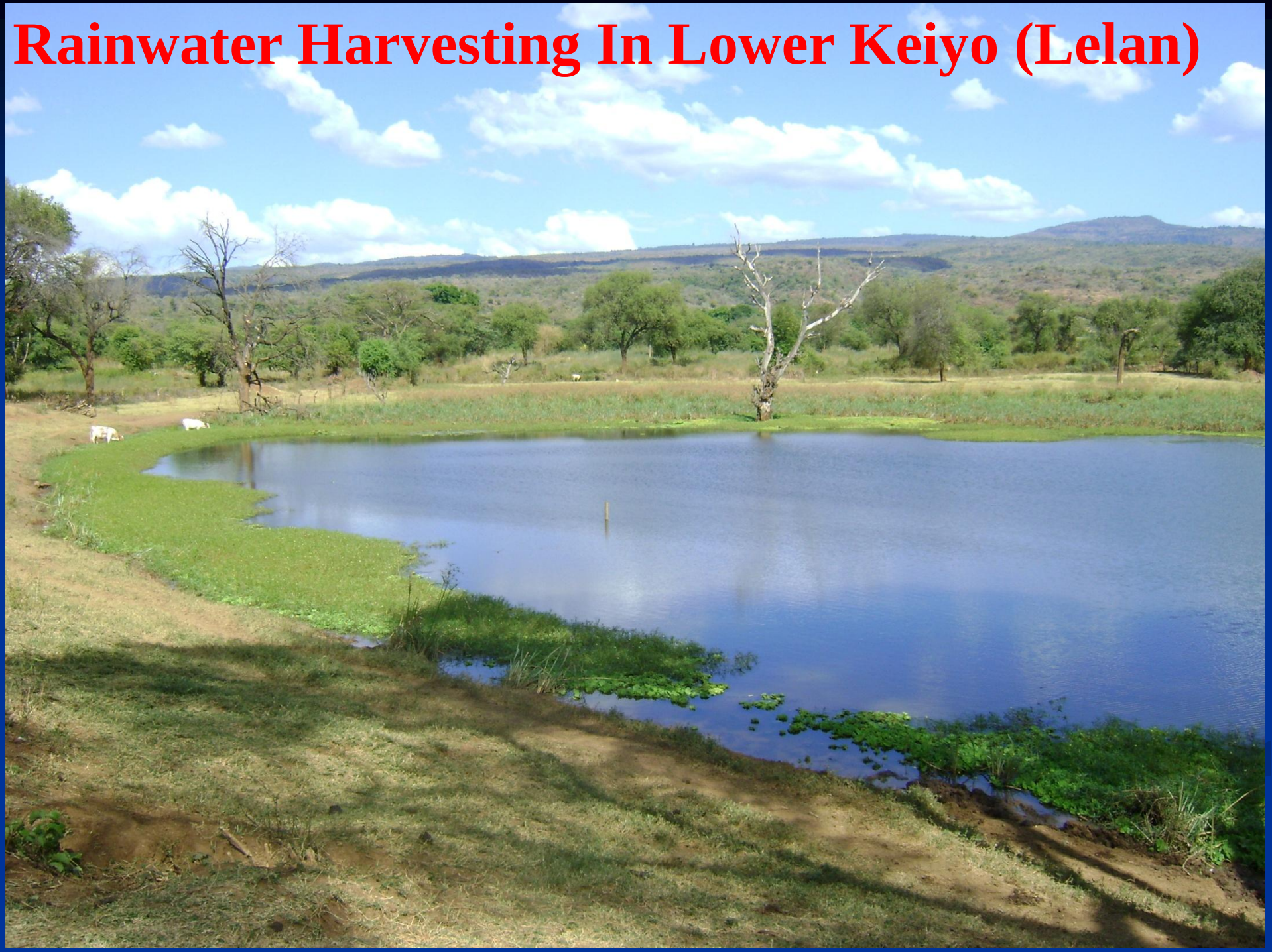
On field Rainwater Harvesting (Tindiret)

Tumbukiza method of rainwater harvesting for crop production and erosion reduction

Contouring in tea farm

Terracing using nappier grass in between maize crop

Rainwater Harvesting In Lower Keiyo (Lelan)



Rainwater Harvesting using community water pans in Kerio (in 'Hanging Valleys' of Mid Keiyo)

Intercropping in Metkei, Upper Keiyo

Indigenous pumpkin crop

Livestock keeping in Lower Keiyo

Improved traditional granary for storing Millet and Sorghum

Conclusion

- Although IKS plays a crucial role in rainfall prediction, food production, CCA & food security, it is no longer reliable ***on their own***, but can be enhanced if integrated with scientific techniques.
- For example by integrating scientific and indigenous knowledge in weather forecasting, indigenous knowledge helps the farmer to prepare for timing and distribution, while a scientific forecast helps them to prepare for amount.
- Household livelihood diversification & establishment of community food reserves, alongside national strategic reserves, to empower communities on the need to ensure food security at the local levels and improve opportunities for marketing of produce.

Recommendations

Based on the results of this study, it is recommended that :

- Monitoring of traditional indicators used in climate prediction, food production & food security to validate their performance and scientific interpretations.

- Policy interventions to integrate IKS and encourage the perpetuation of intra and inter-generational transfer of IKS practices related to food security and CCA.

- Identify traditional food crop varieties suited to local agro-ecological conditions and further research done to improve their tolerance to climate extremes.

- Enhance environmental & biodiversity conservation to improve agro-ecosystem ressilience at the farm-level and contribute towards the overall goal of reducing the impacts of climate change and enhancing adaptation options.

The research was funded by the International START Secretariat, through the US National Science Foundation (GEO-0627839 "Capacity Building for Global Change“)


Thank you for your attention