Introducing myself

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Two thesis: for fulfilment of specialization

1. I. Irrigation
2. II. Integrated Water management

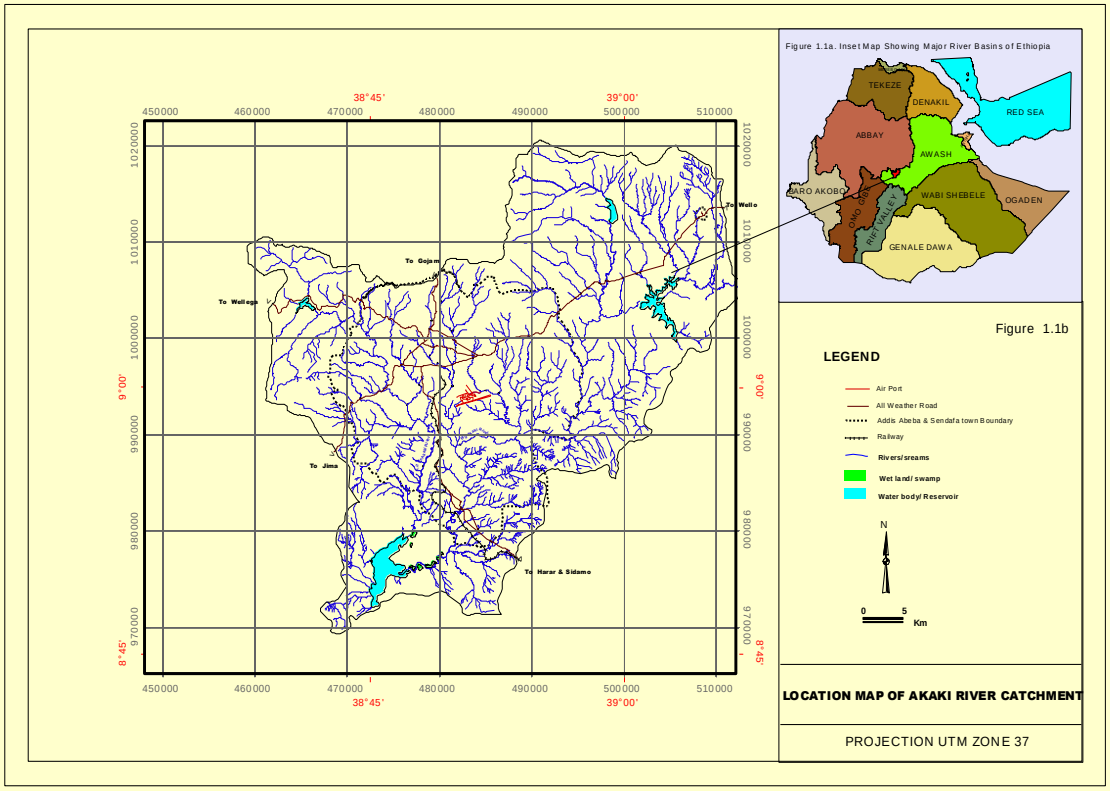
Title

- Background
- Thesis I
  - Problem statement and objective
  - Research question and methodology
  - Result
  - Proposed discussion on suggested measures
- Thesis II
  - Problem statement and Objective
  - Research question and Methodology
  - Result
  - Conclusion and recommendation

I. Preliminary finding of thesis one;

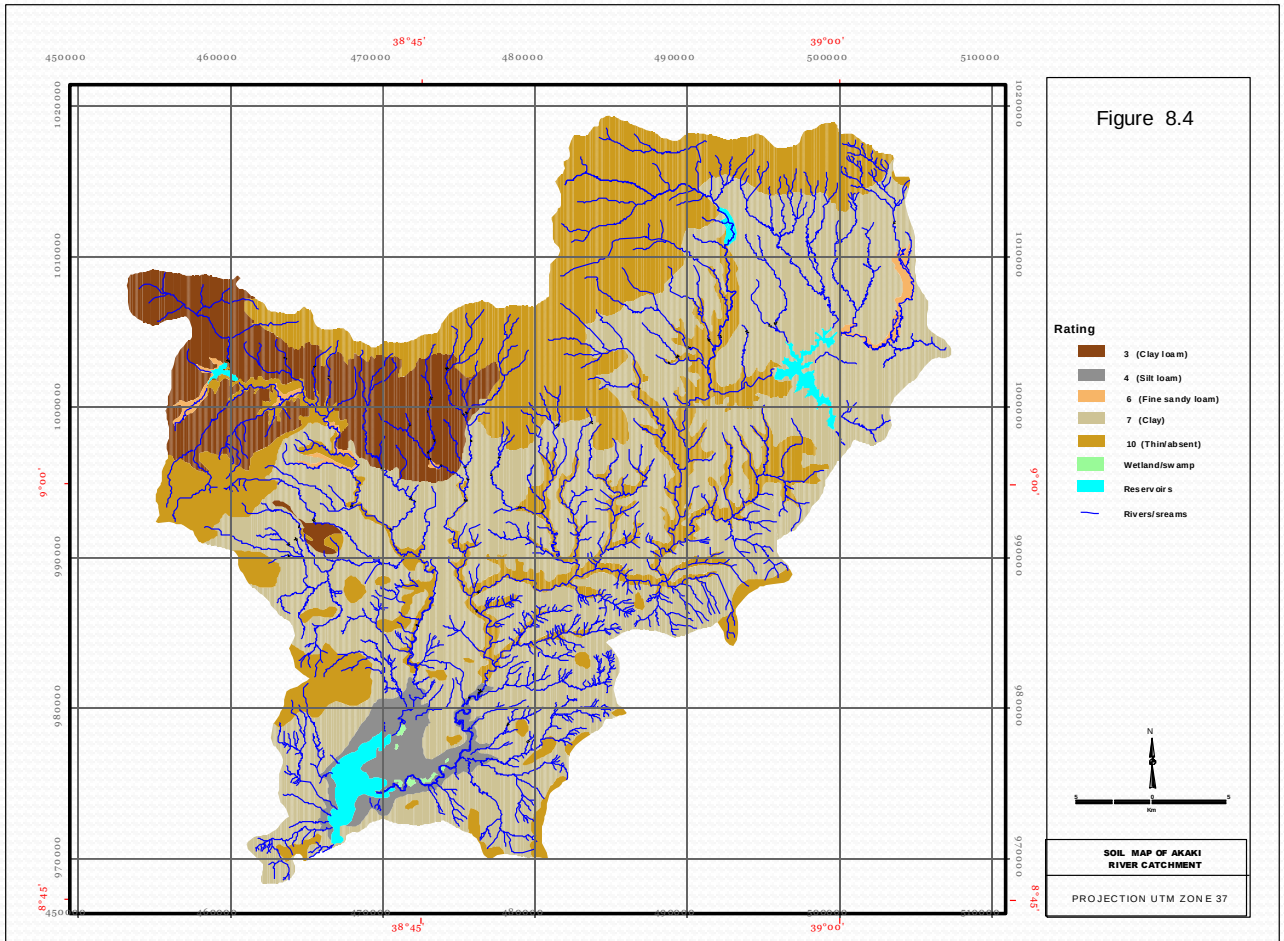
Sustaining water use: Stakeholders strategies under different climate scenarios and need for interventions

Background
Location



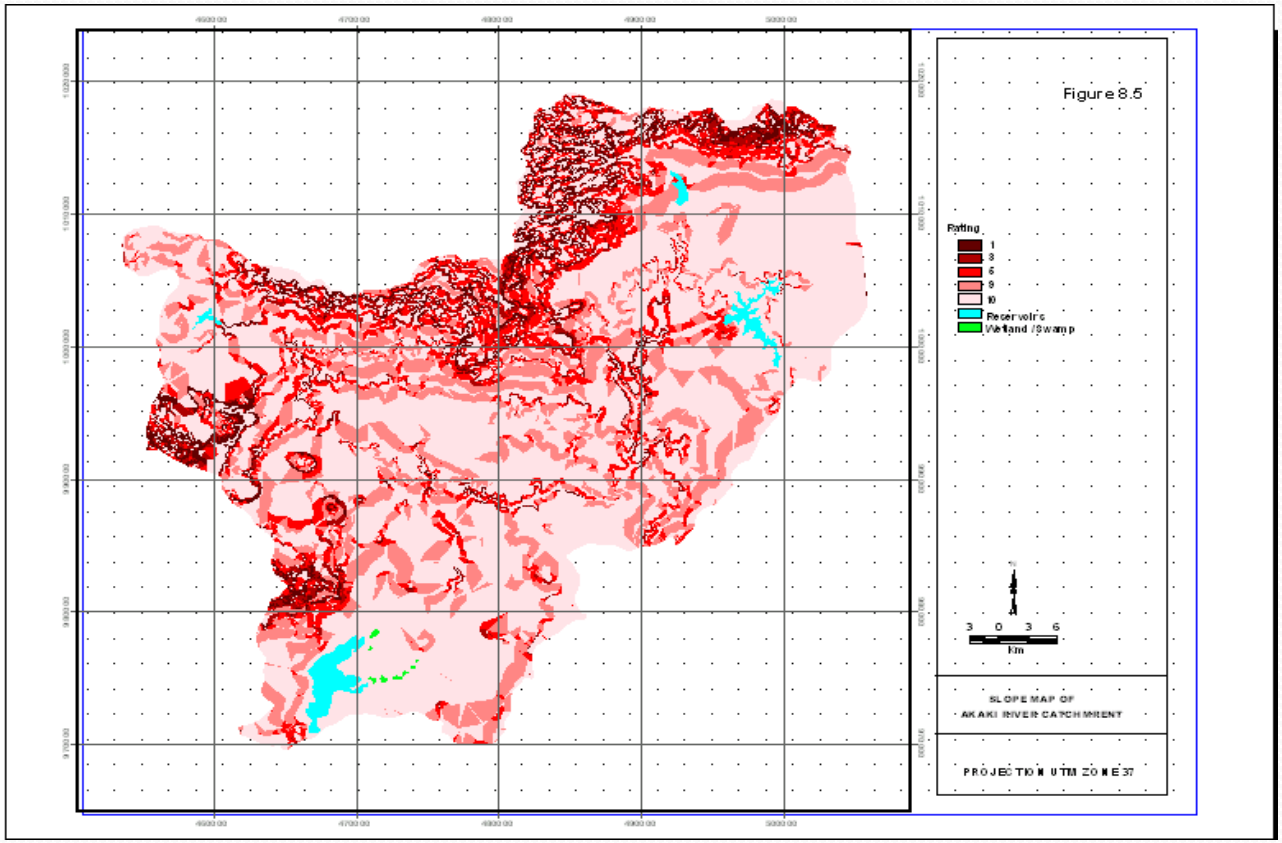
Background

2. Soil Map



Background

- Slope



Problem statement and objective

- Externalities of climate uncertainties, land use, and urbanization/population change alter quality and quantity of Akaki River system.
- Different stakeholders: different mandate and interest->lack of cooperation

Objective: Stakeholder mapping

Problem identification

Developing coping measures

Research question and Methodology

- How the different users of the resource in the basin interact with the resource?
- What problem is there in consequence to change in quality and quantity of water?
- What will be the future potential problem from climate scenarios?
- Methodology: Bio-physical mapping , literature riview and interview

Result

1. Bio-physical changes and externalities

A. Urbanization/population change

- Illegal settlement-Congested settlement->difficult to monitor waste disposal
- Rapid population growth->resource degradation->erosion & flood

Result

A. B. Land use change:

Deforestation: 19,000ha in 1978s reduced to 7,900ha in 1998->58% decline(AAUDF, 2004)

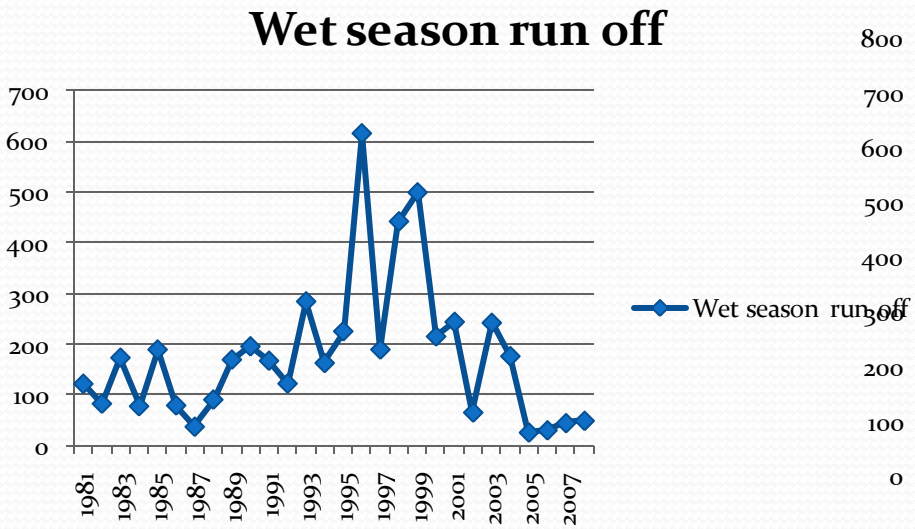
Reason: Population increment->demanding more land

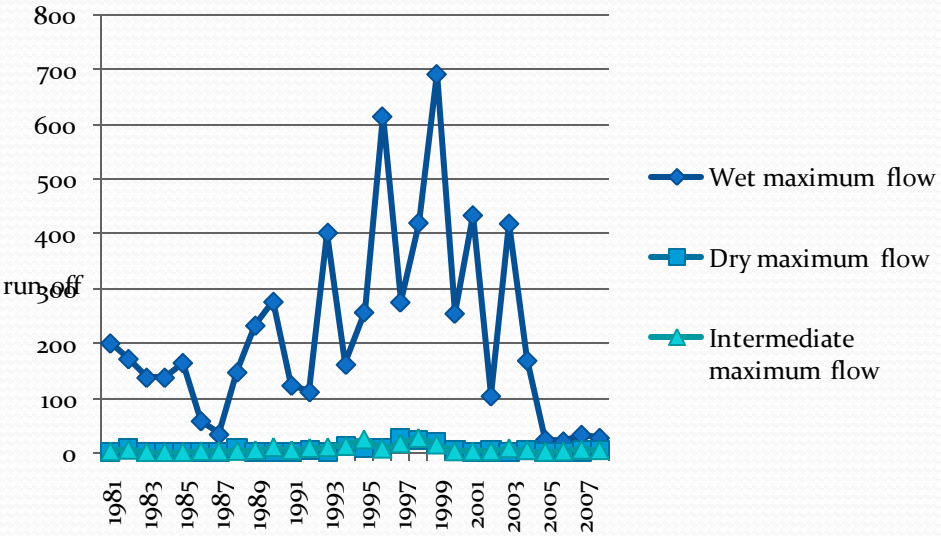
Dependency of on fuel wood for energy demand

Wood is used as construction material

Result

C. Consequences of LUC and U/PC: Past





Result

2. Vulnerable stakeholders and major problems

A. Drinking water:

- Safe water supply coverage 47% for Sebeta and 53% for Akaki Oromiya
- Source developed: Spring, hand dug wells, shallow wells and deep wells
- Spring, hand dug wells and shallow wells are vulnerable to contamination
- Remaining population use highly polluted water used in Sebeta and Akaki Oromia(D/S)

Result

B. Sanitary services:

- Downstream section, particularly in Sebeta and Akaki, the river used for bathing, dress washing and etc
- Skin contact with chemicals and infectious organisms

*Typhoid, typhus, cholera, flue and 'Atat'(a sort of dysentery) are common diseases

* Children death rate is high

Result

C. Livestock and poultry watering

- Livestock use to drink river water
- Large number of livestock die, interviewed people in Akaki oromia estmated as 80 per year
- Poultries are highly sensitive and die more frequently
- Milk production is deteriorated

Result

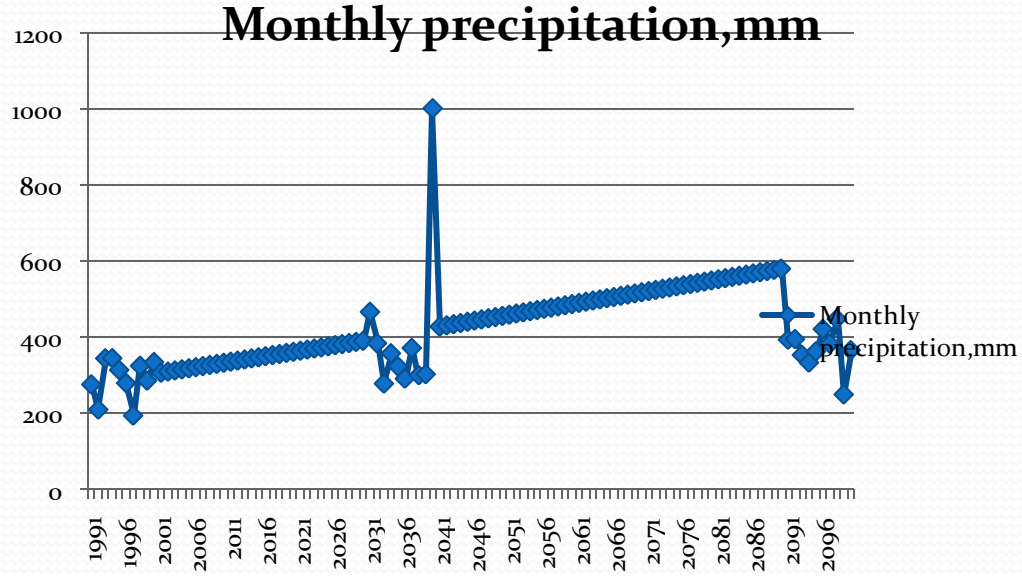
D. Flood Vs Quality

- D/s->Little Akaki river system->all season flood
- Since last 30 years
- Flood resulted in contamination of grazing land->Livestock die
- Agricultural land contaminated->yield reduction and health risk to field worker

Result

3. Climate scenario for flood

Precipitation->indicator for flood event



Suggested technical and administration measures

1. Technical:

- Protection and rehabilitation of forest coverage->improves micro climate
- Finding alternative energy source for fuel wood: Solar panels and biogas with subsidy
- Controlling illegal settlement

Suggest?

- What is your suggestion using your expertise and experience???

II. Understanding the situation of waste water irrigation in community based irrigation schemes: Akaki case, Ethiopia

Problem statement and objective

- Highly polluted water use for irrigation
- Little knowledge and financial capacity to manage at field level

Objective: Assessing of water quality change and the corresponding adaptation mechanisms at field level.

Research Question

Main: How farmers adapted the change in water quality since irrigation has been introduced

Sub-question:

1. How water quality changed over time since irrigation introduced
2. How do farmers adapted the change in water quality
   a. Awareness change
   b. Field activities change
3. What will be pollution level for next 15 years
   a. Projection of pollution
   b. Possible adaptation strategies

Methodology

*Laboratoryl water quality determination

*Observation

*Interview

Result

1. Identification of irrigated farms

A. Farm size

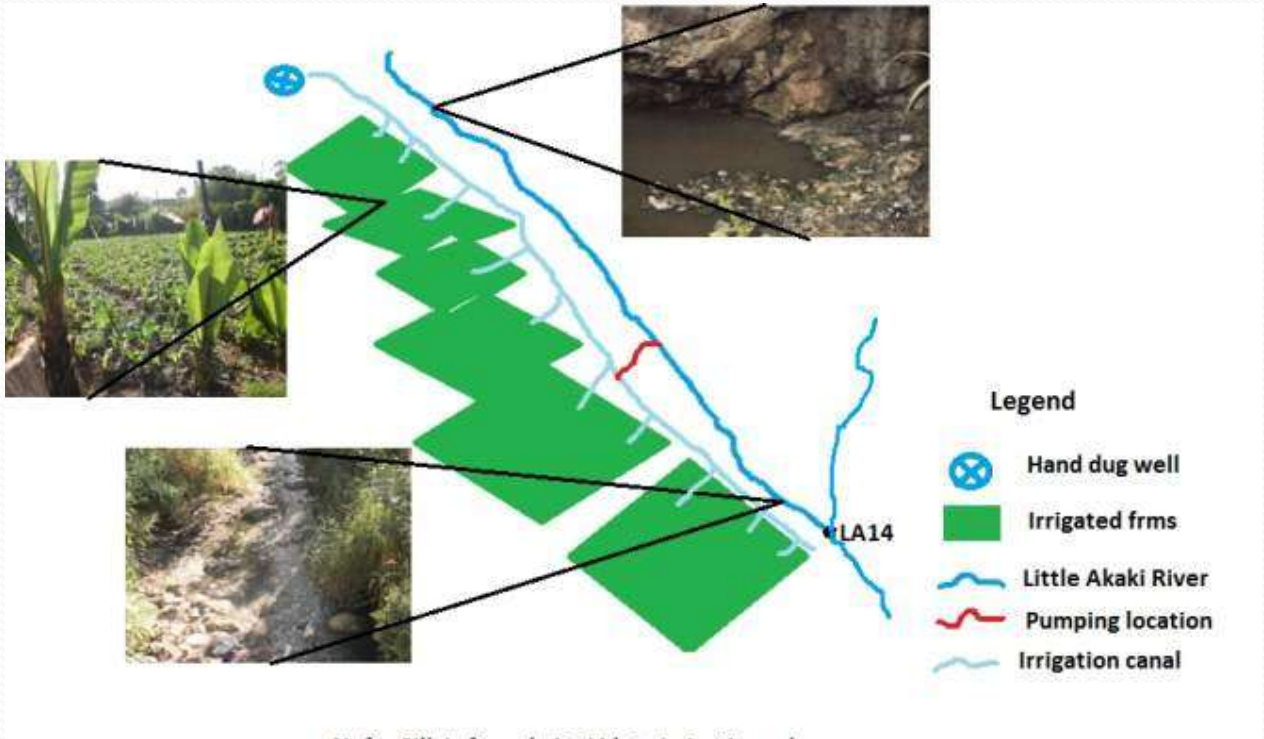
- Akaki sub city and Finfine zone (170 ha)
- Bole sub city (94.6 ha)
- Yeka sub city(7 ha)
- Kolfe-Keranio sub city(56 ha)
- Nifas-Silk Lafto sub city (153 ha)
- Main vegetables grown: Lettuce, Cabbage, Salad, red beat, potato, and onion
- Two growing season: October to January and February to June

Result

B. Characterization

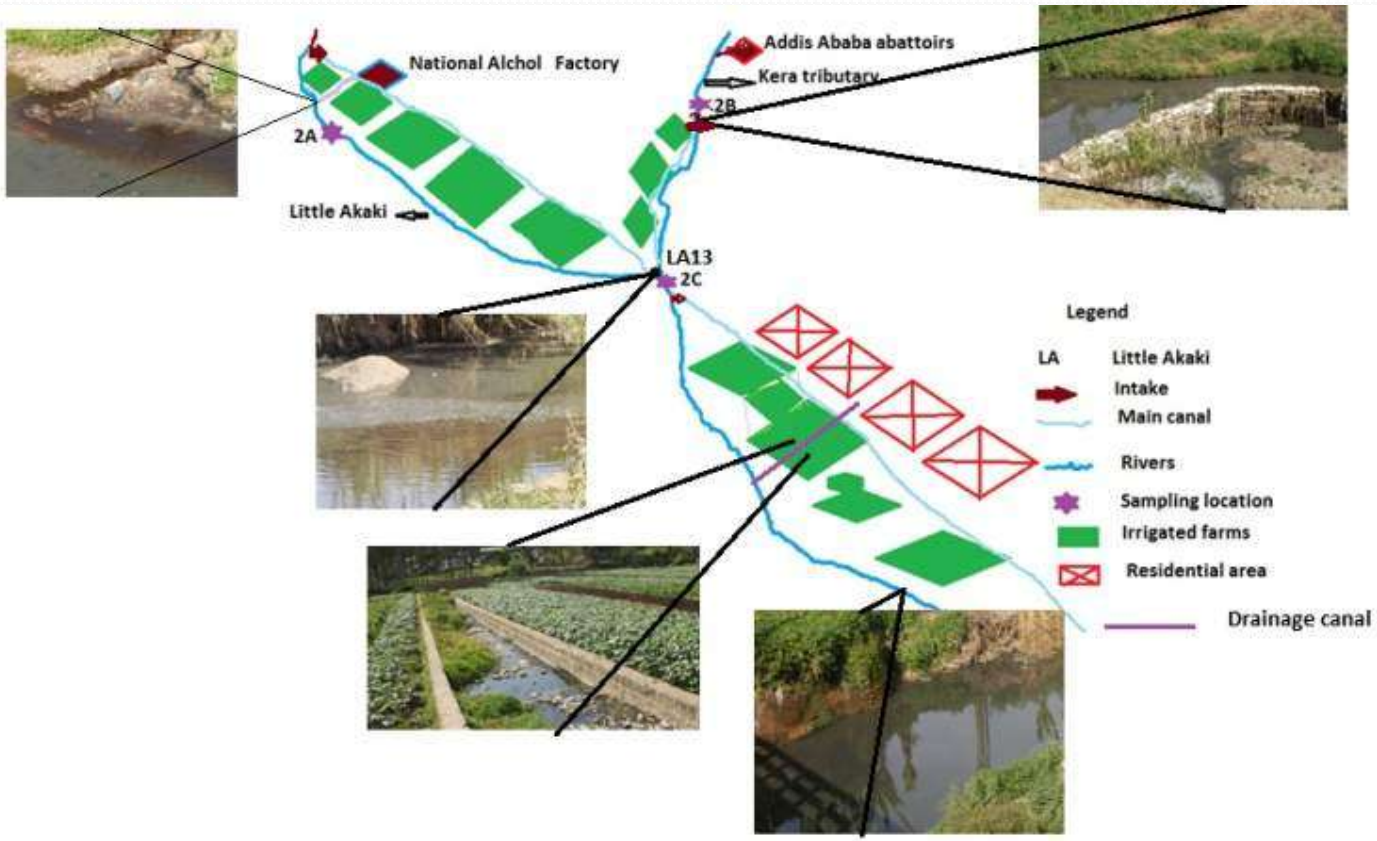
Urban Agriculture

Nefas Silk Lafto:Lideta



Result

- Nefas-Silk Lafto: Mechanisa,Kera,Gofa



Result

Figure 8. Diversion structure from Kera tributary(December 9,2010)

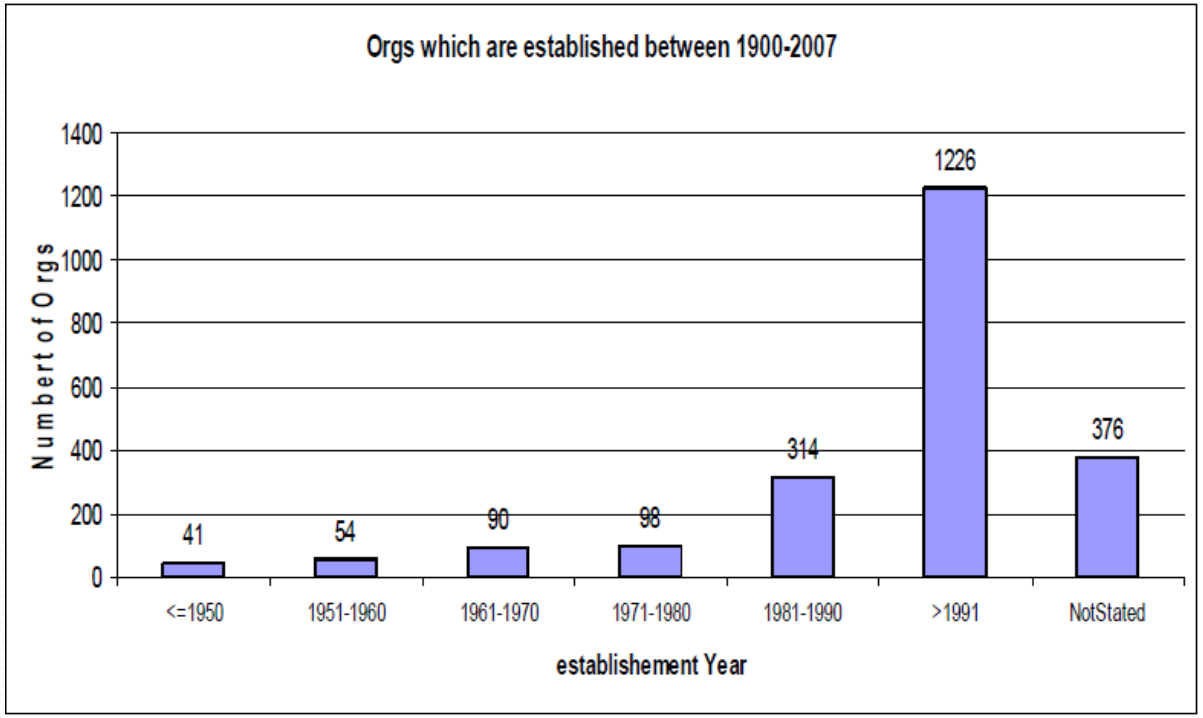
Result

Result

2. Water quality change

Major Industries along Little Akaki river

Waste disposal with out pre-treatment



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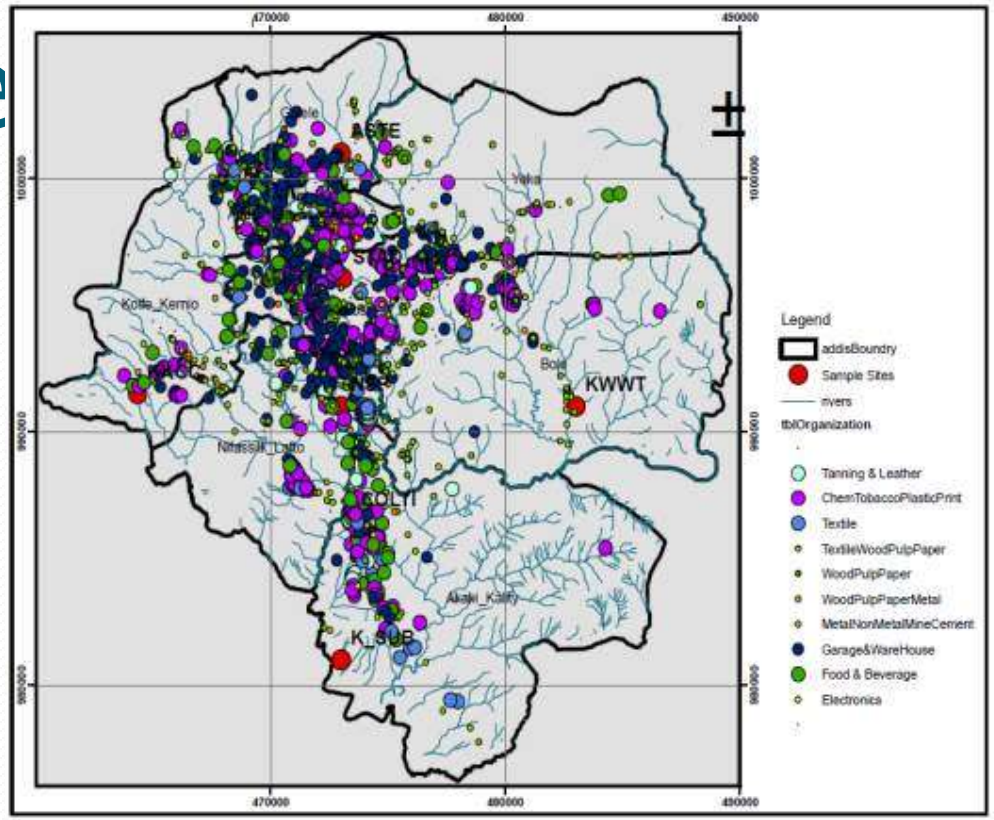
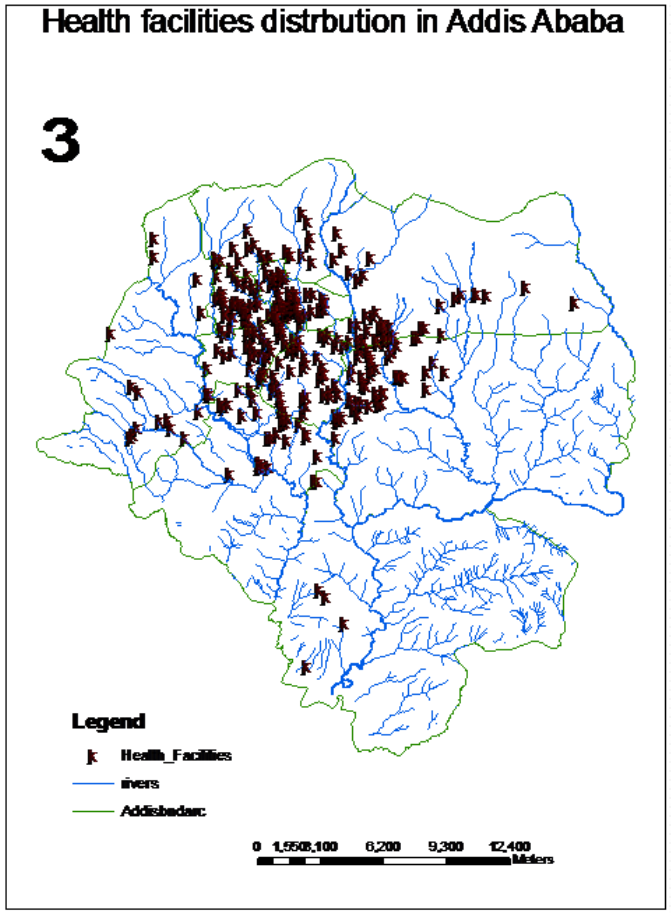


Spatial distribution of industries along Akaki River system(AAEPA,2008)

Result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3
Legend
Health_Facilities
rivers
Addisbadarc
0 1,550 3,100 6,200 9,300 12,400
Meters

Result

Statistical trend anlysis

A. Before 2000

Incomplete data: sampling time and location are not clear

Rough analysis were made

Table 19. Little Akaki River Water quality Trend between 1973 and 2000.

Year	BOD	DO	AMMONIA	NITRATE	PHOSPHATE	PH	SS
1973	60	8	-	2.0	5.0	8	194
1989	246	1	44	-	-	-	-
1997	81	4	8	14	8	8	931
1998	175	3	20	-	-	8	176
Standard	<20		0-5		0-2	6.4-8.5	<20

Result

B. After 2000

- Dry season anlysis
- Remarkable change over the last 10 years.
- PH ,TDS and T for all extraction points is with in WHO and FAO standards
- TSS, COD, and BOD went beyond the standard limit.
- Ammonia, nitrate, sulphate, phosphate and chlorine have been increased over the last years, except the sulphate, the quantities of these parameters exceed the standard limit.
- The total coli forms and E.Coli values have exaggerated value in all sampling years and extraction points->highly infectious
- Trace metals in Bole and Kolfe-keranio sub city, manganese and cobalt; in other areas chromium, cadmium, iron, manganese and Cobalt are above the standard limit.
- The finding of these parameters have indication for associated adverse impacts.

Result

Future change

- With out intervention: BOD, COD, ammonia, nitrate, phosphate, sulphite, chloride, chromium, cobalt, total coli forms, E.coli and manganese will increase for the next 30 years.
- However AAWSA proposed two sewage collection and treatment plants.
- The completion of two projects expected to increase the coverage of sewage.
- By 2008 a proclamation made , a gestation period of five years given for industries to bring their discharge with the quality standards.
- Hoping these activities, better water quality is expected with in the next 30 years.

Result

3. Waste water irrigation

Argumentation to start irrigation

Socio-economical

- Land heritage
- Economical dependency
- Market demand increment for vegetables

Technical

- Accessibility with minimum cost
- Few of them with fertilizer cost reduction

Result

4. Farmers awareness towards water quality change

Farmers have understanding on water quality using the following indicators

Direct: Colour and physical observation

Indirect: Yield reduction, vegetable colour change and abnormal growth

Farmers have little understanding on bacteriological and chemical contaminants

Adaptation:

matching irrigation time

Use of filtering membrane to trap silts

Crop selection

- Little precaution taken by field worker
- Heavy metal transmission to customers?

Result

5. Customers awareness

- In the main market centres, customers give little attention on how it is grown.
- Interviewed customers mentioned that except children all family members use to eat raw vegetables.

Conclusion and Recommendation

Conclusion

- Water quality at extraction points changed remarkably over the last ten years.
- Poor sanitation and sewerage coverage as well as lack of strong monitoring strategy is responsible for water quality change
- Above 90% of industries in the catchment don't have treatment facilities
- Except temperature, total dissolved solids, sulphide, and PH; most of the evaluated parameters are beyond the limit of irrigation water quality standards
- Farmers understand physical water quality change better than bacteriological and chemical changes

Conclusion and recommendation

Recommendation

- Immediate awareness creation program for farmers on bacteriological and chemical quality
- Redesign of traditional irrigation systems, for eg difficulty in evaluating water quality with existing schemes(assumption of FAO<10,000m3 per hectare per year)
- Space for flooding in the d/s farms
- Use globes and Boots for field worker

General suggestion

Extent of damage need to be further investigated for:

- Infected people
- Livestock and poultry death
- Concentration of heavy metals in vegetation
- Yield of vegetable: Fresh vs existing quality

Thank you!