Threats of intensive Crop farming on groundwater Resources Management - Zambia

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Zambia's Economic Outlook

Zambia

- Classified as low-middle income by World Bank
- GDP growing at 6% per annum
- Agricultural growth rate at 7%
- Three consecutive maize bumper harvest years

BUT Persistently high rural poverty: ≈80%

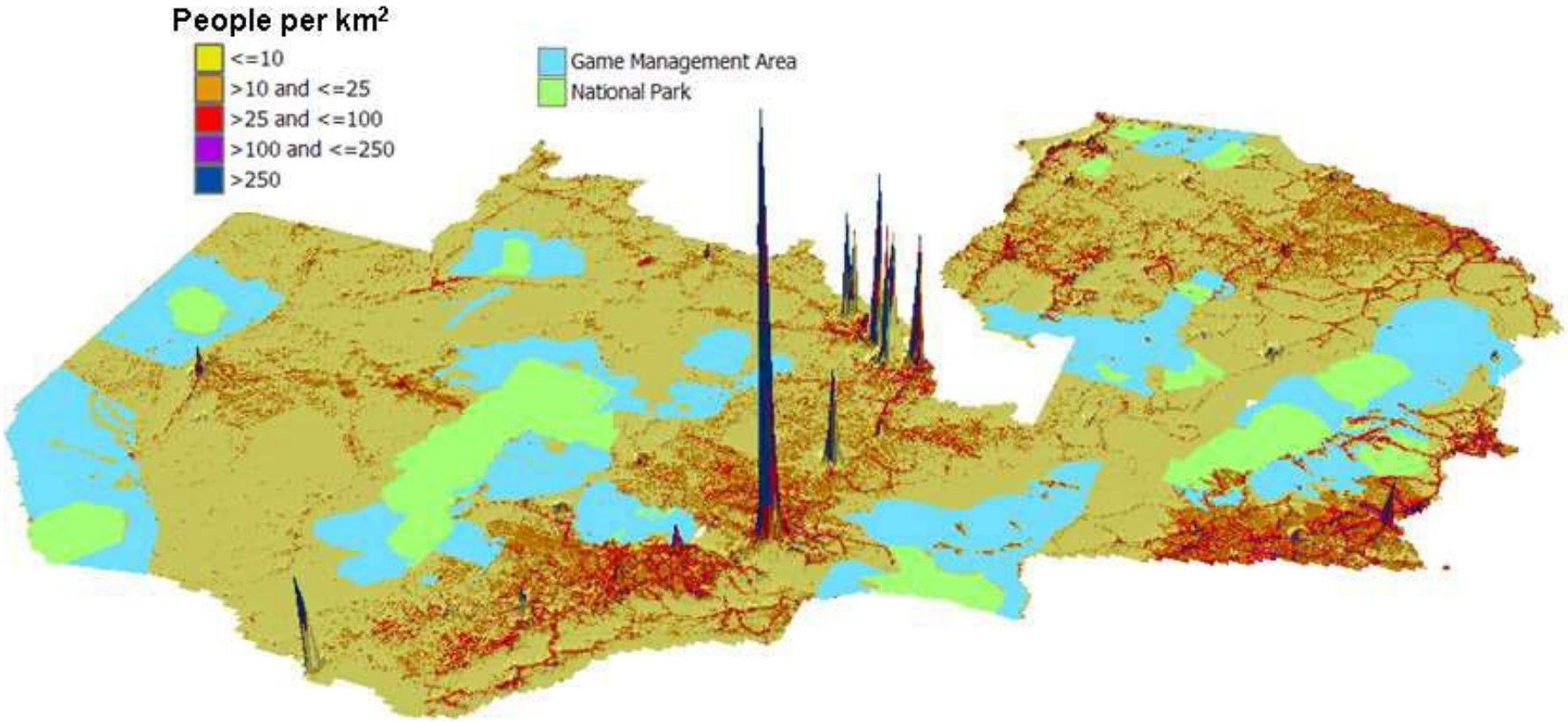
Geographic Location

Behind this backdrop

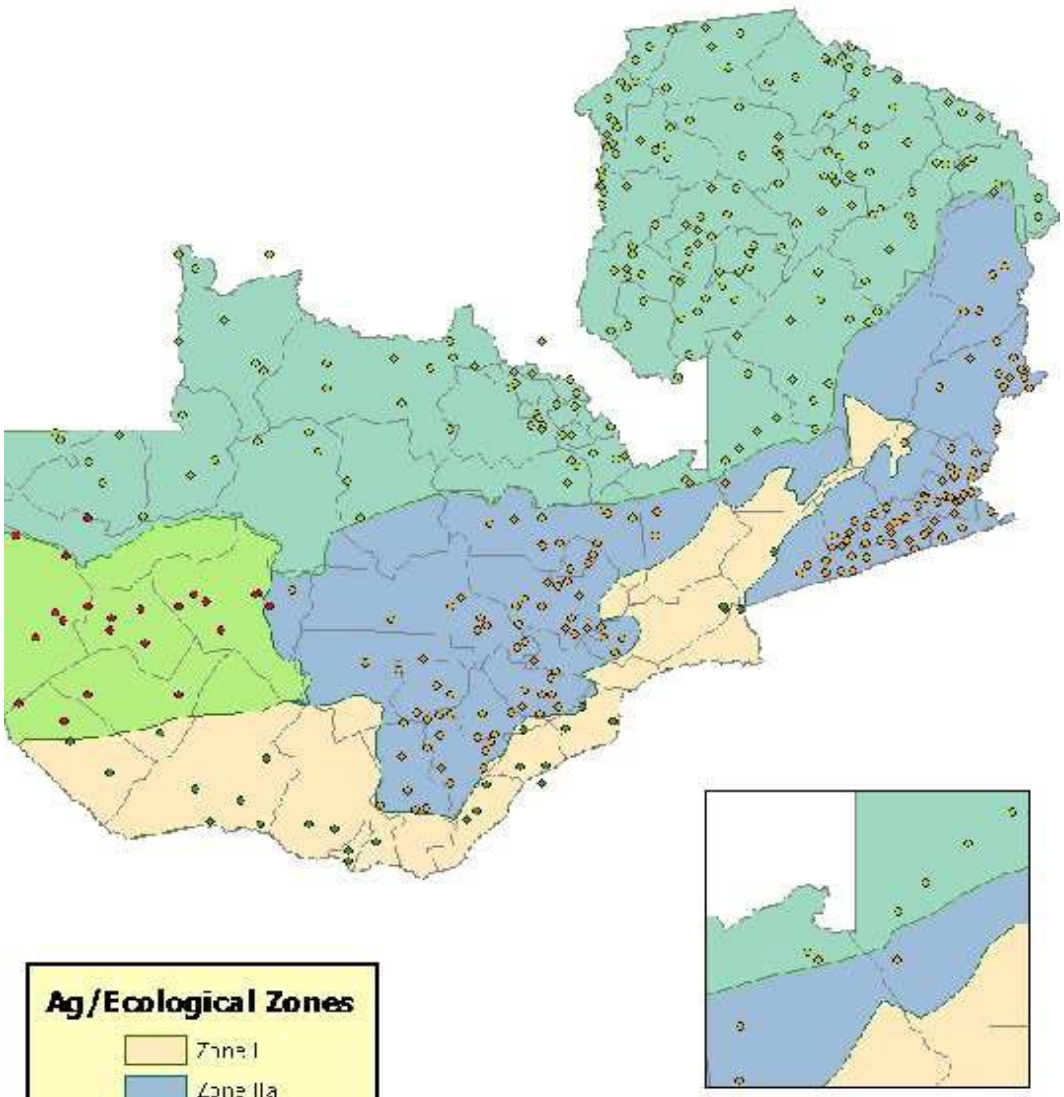
Zambia is characterized by

- Rapid population growth – 13 million
- High poverty rates ~ 80% of rural people poor
- High food and income inequality in urban areas
- Rapid urbanization and increasing demand for food
- Stagnant agricultural production
- Abundance fertile land and water (opportunity)

Large Parcel covered by Wetlands, National Parks, GMA

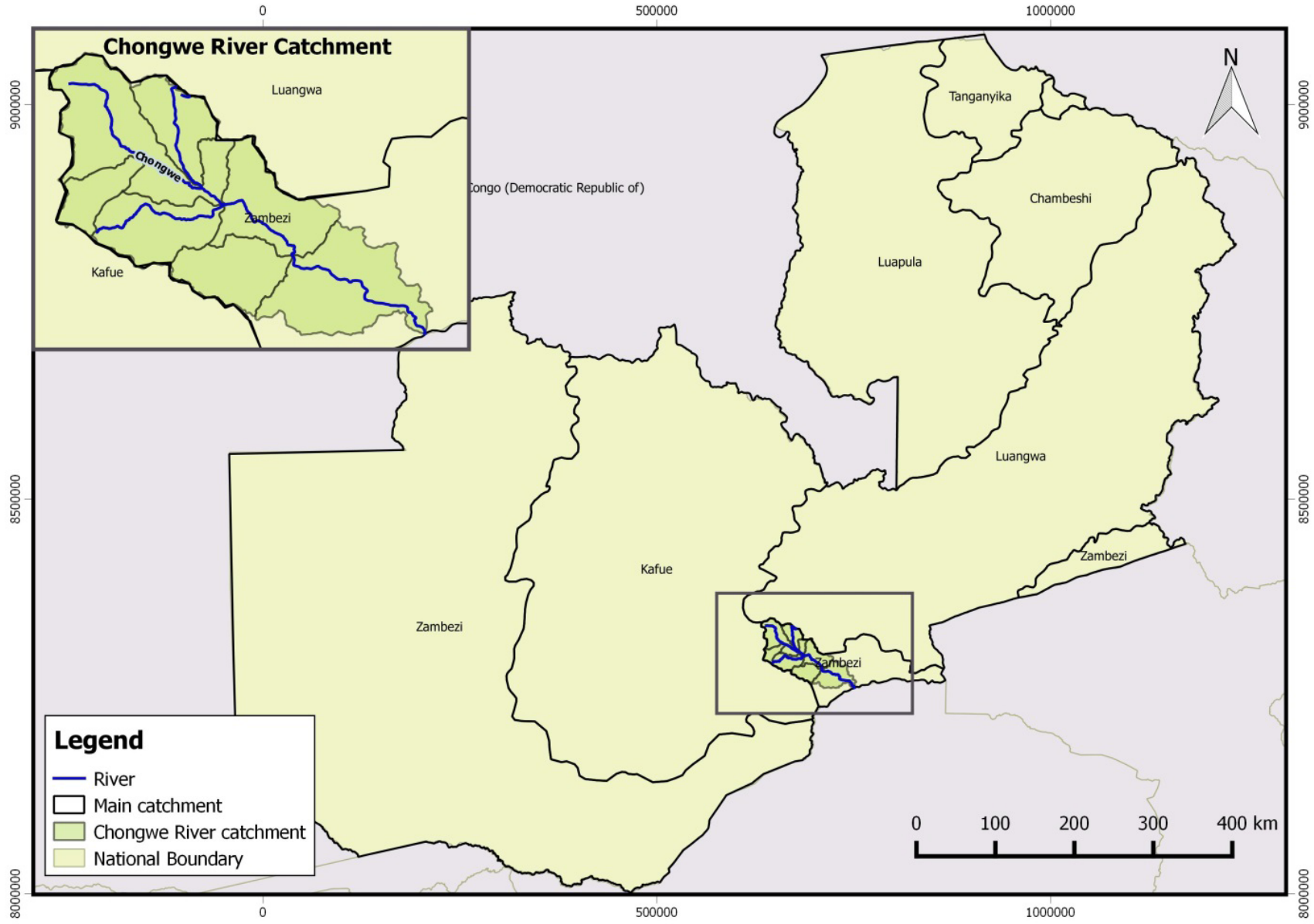


Small holder Farmers in Zambia



Most of Zambia's food are met by Smallholder Farmers whereas most Commercial export.

CASE SITE


Chongwe River Catchment
Luangwa
Chongwe
Zambezi
Kafue
Congo (Democratic Republic of)
Tanganyika
Chambeshi
Luapula
Luangwa
Zambezi
Kafue
Zambezi
Zambezi
N
0
500000
1000000
9000000
8500000
8000000
Legend
River
Main catchment
Chongwe River catchment
National Boundary
0
100
200
300
400 km

Case study Focus

- **18 Small scale farmers with a cultivated area of 74 ha and 35.5 ha irrigated were surveyed.**
- **Using remote sensing - small scale farmers cover a total of 8000 ha**

Table 1 Cultivated area in total and per season

Type of Crop	Area Coverage (%)	Total Area (ha)	Area in Rainy Season (ha)	Area in Dry Season (ha)
Tomato	42.2	31.25	29.25	30.25
Maize	39.8	29.5	29.5	0
Rape	5.4	4.25	4.25	3.75
Groundnuts	2.1	1.62	1.62	0
Cucumber	1.6	1.25	1.25	0.5
Pepper	1.0	0.75	0.50	0.75
Sweet Potato	0.6	0.5	0.5	0
Cabbage	0.3	0.25	0	0.25
Sub-Total	93	69.37	66.9	35.5
Other crops/fallow land	7.0	4.63	7.1	38.5
TOTAL	100	74	74	74

Water Abstraction

Table 2 Estimated (and rounded) abstraction rates for surface water compared to crop requirements

Abstracted surface water in m^3/year (assuming three crop cycles, on 18 surveyed farms, based on pump specifications and duration)	1,221,000
Abstracted surface water in m^3/period	407,000
FAO water requirements for 31,25 ha tomatoes in m^3/period (assuming crop requirement of 500 mm, period = 3 months)	156,250
FAO water requirements for tomatoes in m^3/year (assuming three crop cycles)	468,750
Estimated water abstraction for 150 farmers in m^3/year	10,175,000

Potential Pollution to Groundwater

Fertilizer and Pesticides

- **Artificial fertilizers**

Use almost 36,360 kg/a of fertiliser against between 30 – 45 000 kg/a

- **Pesticide - Dursban (Chlorpyrifos, organophosphate, insecticide), Cypermethrin (Pyrethroid, insecticide), Endosulfan (organochlorine, insecticide), Azoxystrobin (fungicide),Tebuconazole (systemic fungicide), Chlorothalonil (non-systemic fungicide), Diphenhydramine, Trimangol**

Regulatory mechanisms on Pesticides and fertilizers

- Critical are measures to improve productivity of small holder agriculture, and increase household incomes from both food and cash crop production.

- Policies designed to achieve this objective include input subsidies in the maize sector, extension service delivery, farm mechanization and infrastructure development.

- Productivity increases are envisaged to result from better use of inputs including use of chemical fertilizer and adoption of conservation farming practices to improve and conserve soil fertility

- Use of chemicals (pesticides and herbicides) **not firmly controlled and regulated leading to widespread concern about their environmental and health effect.**

Who are the actors/players and perception on Fertilizer/Pesticide use?

- Small scale farmers (Increased productivity and fertility of land)
- Consumers (Health concerns)
- Government (Increase GDP from the sector)
- regulatory bodies (sustainability of agriculture practice and impacts of the environment)
- Local authority (land deterioration)
- Local traditional leadership (desire to receive more fertilizers/pesticide to reduce poverty).

Awareness Methods and Capacity

- Media (Newspapers, manuals, newsletters and Radio)
- Public Awareness Campaigns
- Stakeholder meetings with local leadership
- Agriculture extension services
- Traditional leadership

Capacity (knowledge, resources, processes) is limited due to awareness of the long term threat and no evidence.

Conclusions

- Ensure that within the sound management of chemicals mainstreaming programs capacity to diagnosis, treatment and manage poisoning cases is improved, and more accurate health statistics and scientific information to support future policy analysis is collected and properly documented.

- Develop a more elaborate and durable institutional framework for engaging key stakeholders in the development and implementation of key activities on chemical management in the country.

- Provide targeted farm extension services covering farm management approaches and technologies, sound chemical management including better spraying techniques and chemical handling guidelines

- provide for clear chemicals regulations, enforcing stricter chemical labeling requirements and clear guidelines for the placement of hazardous agro-chemicals on the domestic market

- support technological innovation and development including bio-technology engineering projects that are capable of producing more pest resistant varieties.

- review regulatory instruments to ensure that sufficient revenues are collected to finance health and environmental mitigation programs associated with chemical pollution from agro-chemicals in the country

THANK YOU FOR YOUR ATTENTION!