

Profitability Assessment: A Case Study of African Catfish (*Clarias gariepinus*) Farming in the Lake Victoria Basin, Kenya

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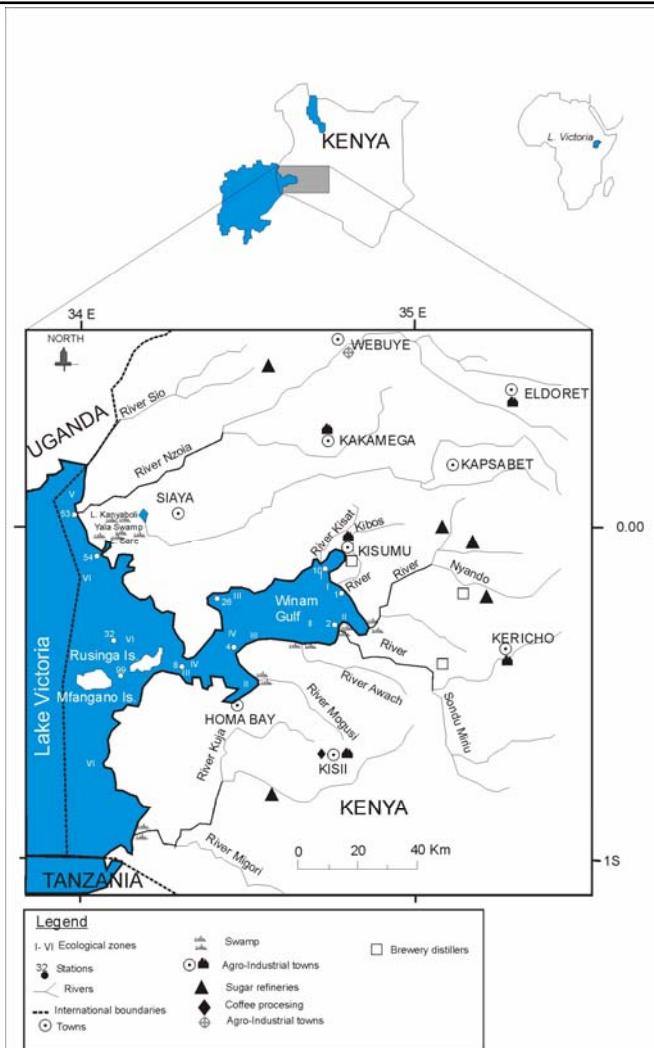
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Motivation

- ❑ No reports on the economic evaluation of aquaculture production systems in Kenya (other than the few case studies on tilapia).
- ❑ Yet economic considerations are crucial in the selection of an appropriate aquaculture production system.
- ❑ Currently aquaculture is almost entirely for subsistence, with little surplus production being sold in the rural market.
- ❑ Fish farmers lack information on how to assess profitability
- ❑ This has hampered aquaculture development in the country.

Study area

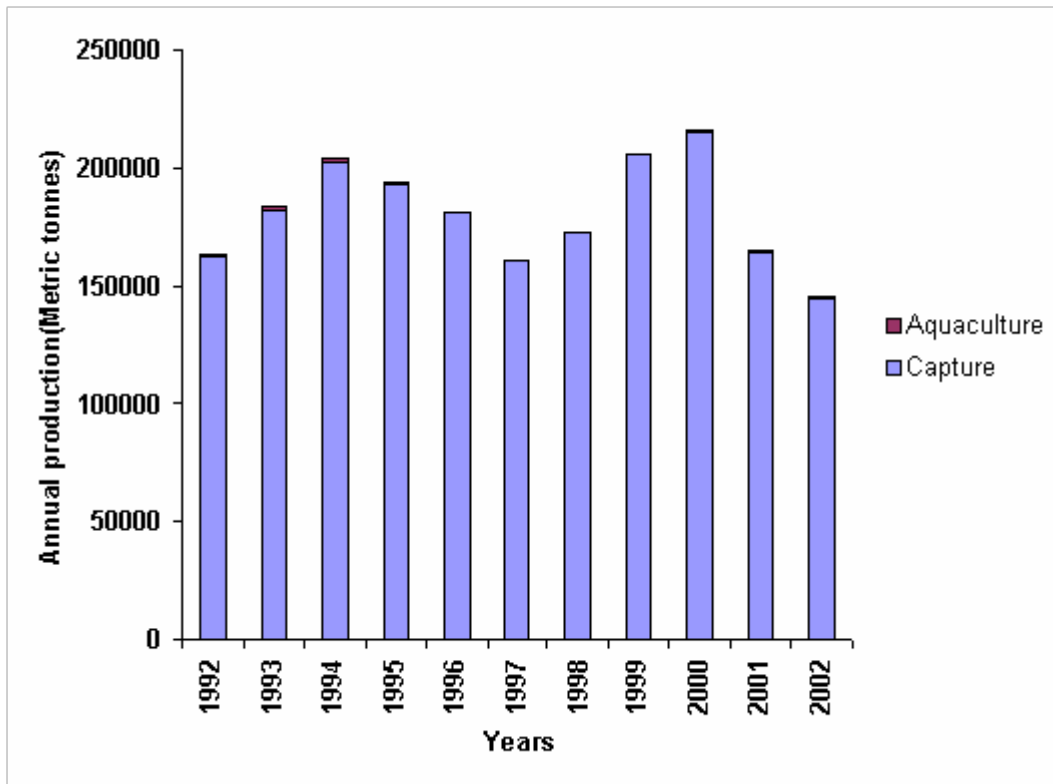


Basin/Catchment area: 38,913 Km²
Densely populated = 9 million people
Annual rainfall of 1,000 – 13,000 mm
Temperature range of 14 – 34°C
Multi-river basin

*Enhanced potential for
Aquaculture development.

Background information

Aquaculture contribution to total fish production in Kenya (adapted from FAO 2002)



Annual Production:

Average: 180,000 Metric tonnes (MT)

Commercially important fish species:

Lates niloticus (Nile perch) = 58%

Rastrineobola argentea (Dagaa) = 30%

Oreochromis niloticus (Nile tilapia) = 10%

Aquaculture < 1% of the total production

(main species: tilapia, trout & catfish)

Why catfish farming?

- ❑ Grows fast and feeds on a large variety of agriculture by-products.
- ❑ Can be raised in high densities resulting in high net yields (6–16 t/ha/year).
- ❑ Higher price than tilapia as it can be sold live at the market.
- ❑ Hardy and can tolerate adverse water quality conditions.



Goal/Vision

- To develop a decision support tool for profitability assessment of fish farming.
- To study the Feasibility of Catfish farming in the Lake Victoria Basin.
- The vision: This might in the future be valuable for the sustainability of fish farming in Kenya.



Fish Farming Assumptions

Characteristic	Assumed values
Stocking density	5 catfish/m ²
Initial weight of catfish stocked	10 g
Cost of catfish fingerlings	5 KSh/individual
Survival at harvest	50%
Cycle length	28 weeks
Harvest weight catfish	442 g
Catfish price	120 KSh/Kg
Yield-live catfish	8.84 ton/ha
FCR	3.8
Cost of supplementary feed/diet	13.8 KSh/Kg

Investment Assumptions

Financing	KSh 948,000
Loan	KSh 663,600 (70%)
Equity	KSh 284,400 (30%)
Working capital	KSh 140,000

Other assumptions

Area	1 ha
Pond area	0.08 ha
Pond cost	KSh 36,000/pond
Land cost	KSh 250,000/ha
Number of ponds in ha.farm	12 ponds
Hourly wage	KSh 50

Production Assumptions

Urea

Cost

KSh 30/Kg

Quantity

90 Kg/ha

Diammonium Phosphate

Cost

KSh 30/Kg

Quantity

30 Kg/ha

Agricultural Lime

Cost

KSh 10/Kg

Quantity

5000 Kg/ha

Fishmeal

KSh 35/Kg

Rice bran

KSh 8/Kg

Wheat bran

KSh 10/Kg

Land, house and store

KSh 500000

Equipments

KSh 288000

The operation system used is semi-intensive



The models developed

- Production model for one pond
- Production model for 12 ponds
- Profitability model:
 - Investment & Financing
 - Operating Statement
 - Balance Sheet
 - Cash Flow
 - Profitability Measures & Sensitivity Analysis

One pond model

- Pond size 800 m²
- Stocked with 4000 fingerlings at 5 / m²
- Limed at a rate of 5 tonnes ha⁻¹
- Urea at a rate of 90 kg ha⁻¹
- DAP at a rate of 30 kg ha⁻¹
- Supplementary feed (daily)
- After every 2 weeks pond is sampled (mean body wts & % survival rates)
- Used to compute biomass of fish in pond
- Based on biomass fish is fed daily for culture period of 28 weeks
- Fish harvested, net production weight determined & sold at Ksh. 120/kg

One pond production model

Production data on monoculture of the African catfish, density 5 fingerlings m², mean temperature 25-27 °C

Week	Survival rate (%)	NO. of fish	Mean body weight (g)	Biomass (Kg)	Feeding rate (%/biomass/day)	Feeding (Kg/800 m ² /day)	Cost of feeds (Ksh)	Fertilizing costs /two weeks (Ksh)	Total Costs ThKsh.
0	100	4.000	10	40	5%	2	386	257	22,0
2	75	3.000	18	54	4%	2	417	257	2,0
4	65	2.600	29	75	4%	3	510	257	2,1
6	60	2.400	37	89	3%	3	515	257	2,1
8	60	2.400	50	120	3%	3	649	257	2,2
10	60	2.400	63	151	3%	4	730	257	2,3
12	55	2.200	80	176	2%	4	816	257	2,4
14	55	2.200	105	231	2%	5	1.026	257	2,6
16	55	2.200	130	286	2%	6	1.160	257	2,7
18	55	2.200	160	352	2%	7	1.292	257	2,9
20	50	2.000	203	406	2%	7	1.412	257	3,0
22	50	2.000	252	504	2%	8	1.461	257	3,0
24	50	2.000	318	636	2%	10	1.843	257	3,4
26	50	2.000	375	750	2%	11	2.174	257	3,7
28	50	2.000	442	884	2%	13	2.562	257	4,6
							16.95	3.852	60,9

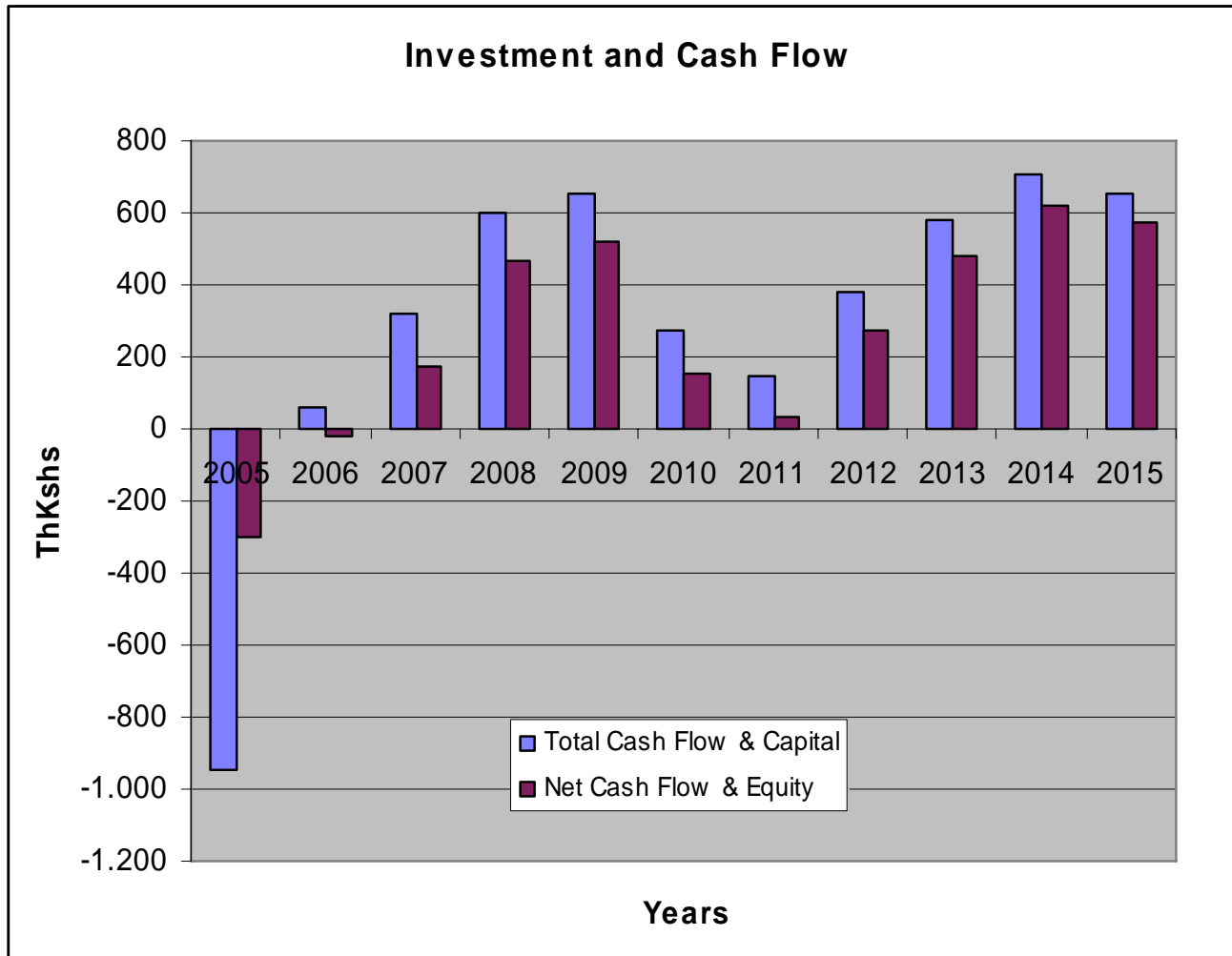
Summary: Revenue, costs and net profit contribution.

Revenue:		
Sales Price	120	Ksh./kg
Income	106,1	ThKsh.
Costs:		
Other costs	11,0	
Feeding	17,0	
Fertilizing	3,9	
Fingerlings	20,0	
Labour	8,7	
Harvest cost	0,4	
Total Costs	60,9	
Net Profit Contribution	45,1	ThKsh.

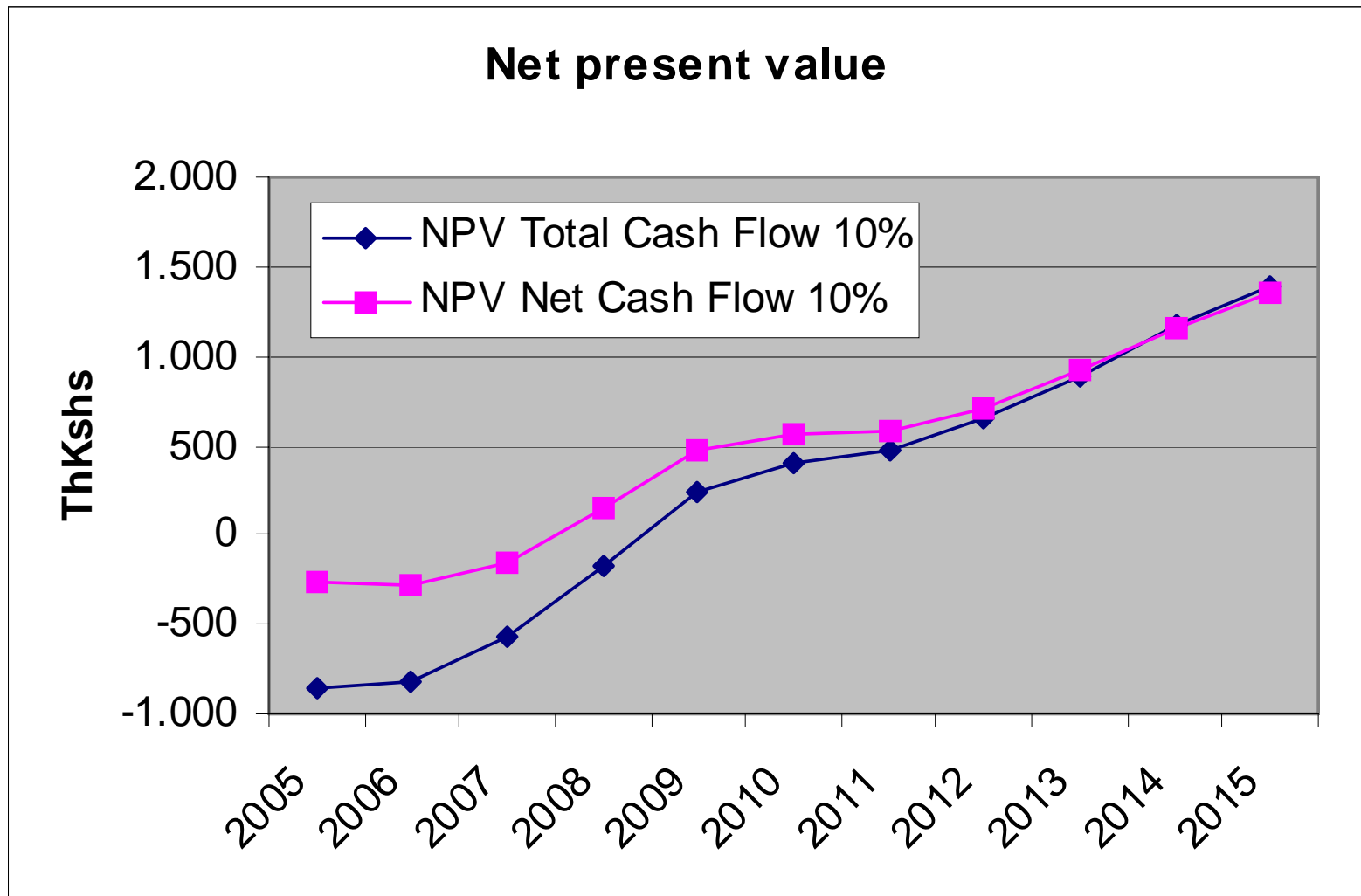
Twelve pond model

- Information from one pond used to prepare production planning model for 1-ha (12 ponds each 800 m²)
- Two ponds stocked with catfish fingerlings every month to have continuous production
- After 6 months in operation all 12 ponds were stocked and the first 2 ponds harvested in the 8th month
- Economics of scale

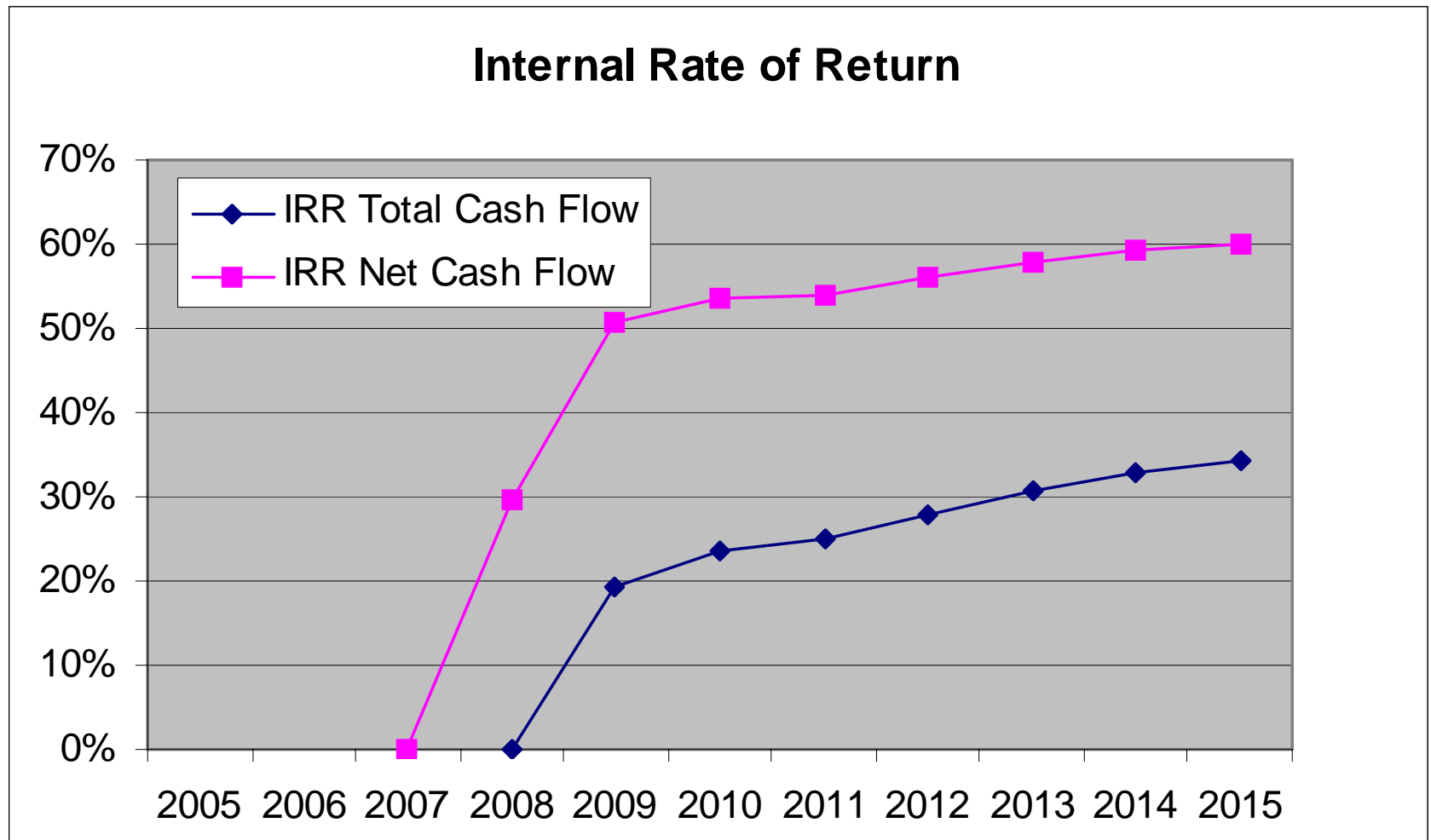
Investment & Cash Flow chart



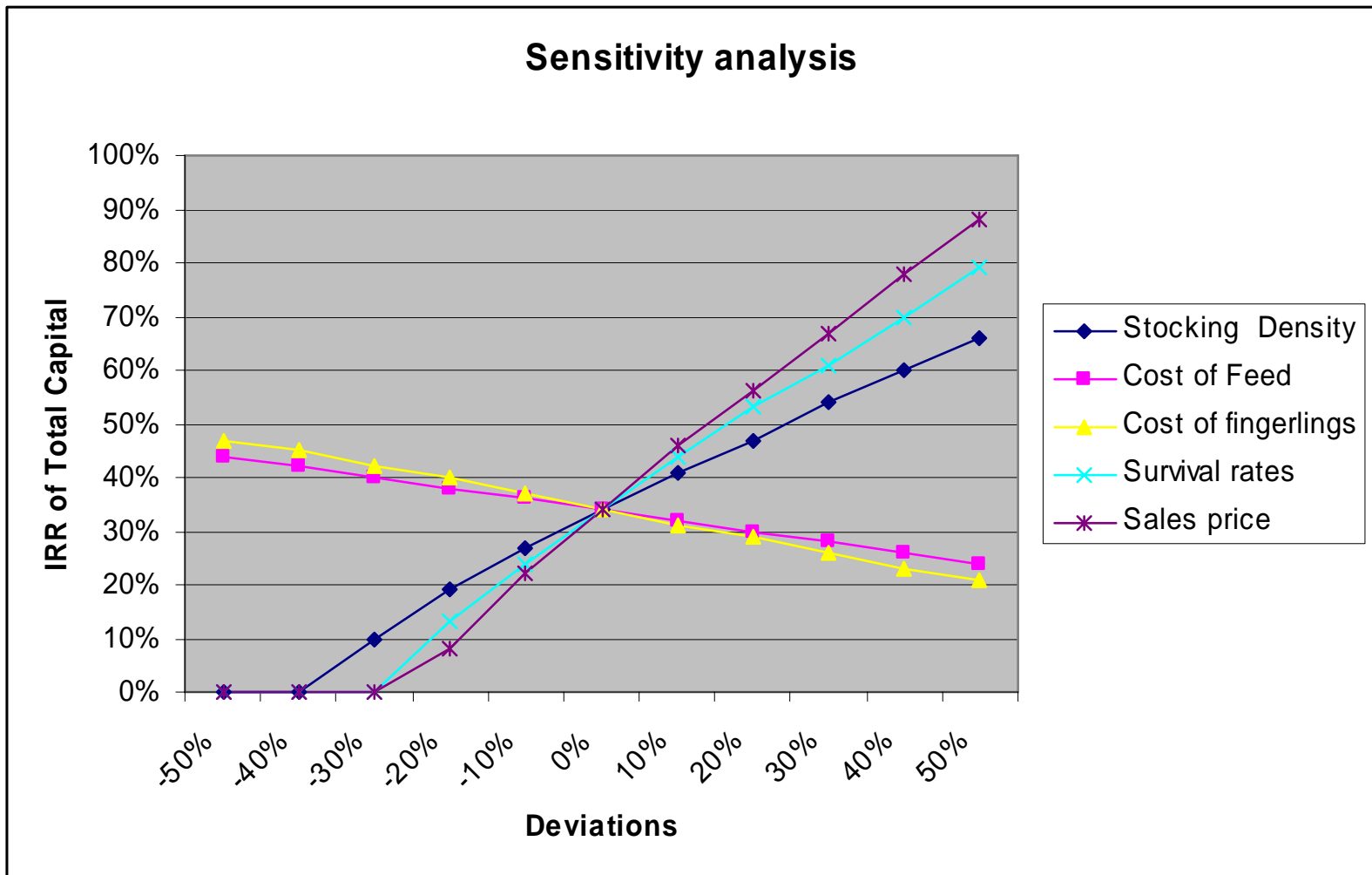
Profitability measure: NPV



Profitability measure: IRR



Sensitivity analysis



Conclusions

- ❑ Purpose of study: To develop a generic tool to assess the profitability of fish farming.
- ❑ A valuable management tool to aquaculture farmers, investors and financial institutions and banks.
- ❑ Based on the assumptions and analysis of the model, catfish farming appears feasible and profitable along the Lake Victoria Basin, 9t/ha/yr -12t/ha/yr.
- ❑ Need to test modeled yields in real farm situation
- ❑ Uncertainties and risks: Monte Carlo simulation



By-products

Two documents developed:

- Brochure: Fish Farming-getting started
- Record keeping and data collection for small scale fish farming

For your attention



Farm catfish & make money