

Water and nutrient budgets of traditional pangasius (*Pangasianodon hypophthalmus*) production ponds in Mekong Delta, Vietnam



*Nhut.N, Huynh.V.N, Verdegem, M.C.J,
Hao.V.N, Verreth, J.A.V, Roel.Bosma, Ep,Eding*



Introduction

- More than 95% striped catfish production from earth pond
- Annually 1.3 million MT
- 5500 ha , 54000 farms & 220,000 people (indirectly & directly) for working.
- High water exchange daily
- No aeration

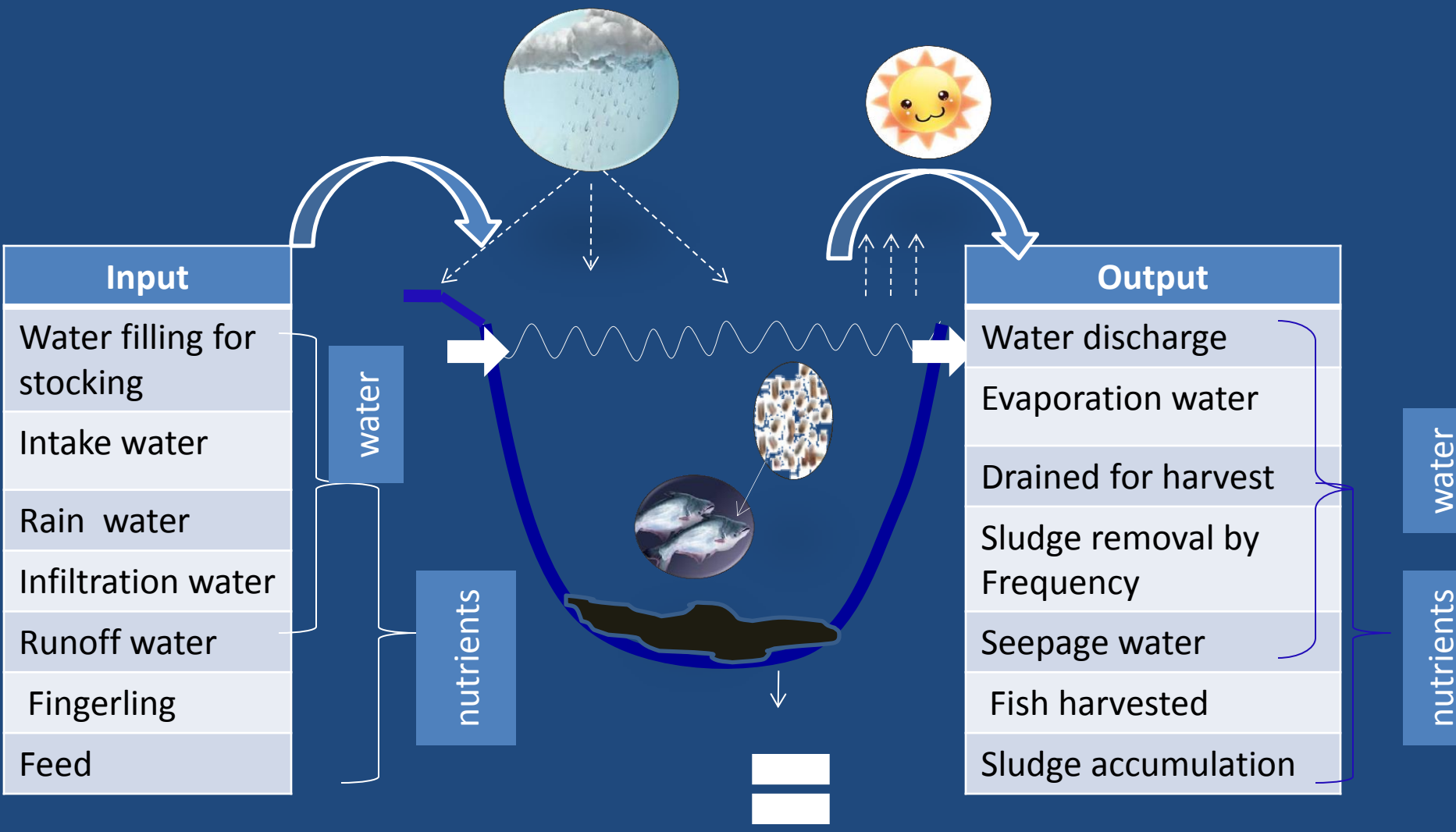


Aims of research

- To understand water and nutrients balance detail
 - *To consider improving sustainability*
 - *to develop sustainable technologies for pangasius*



How do we make water and nutrients balance?



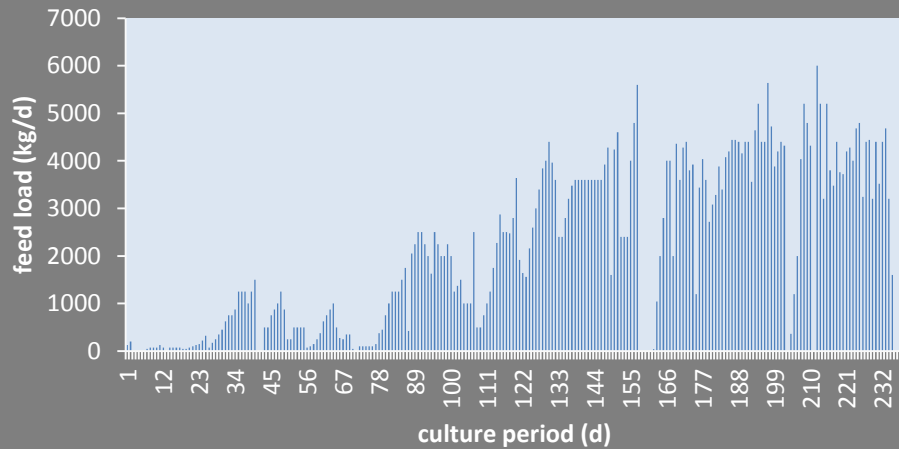
Water and nutrients (N,P and C)

Pond information

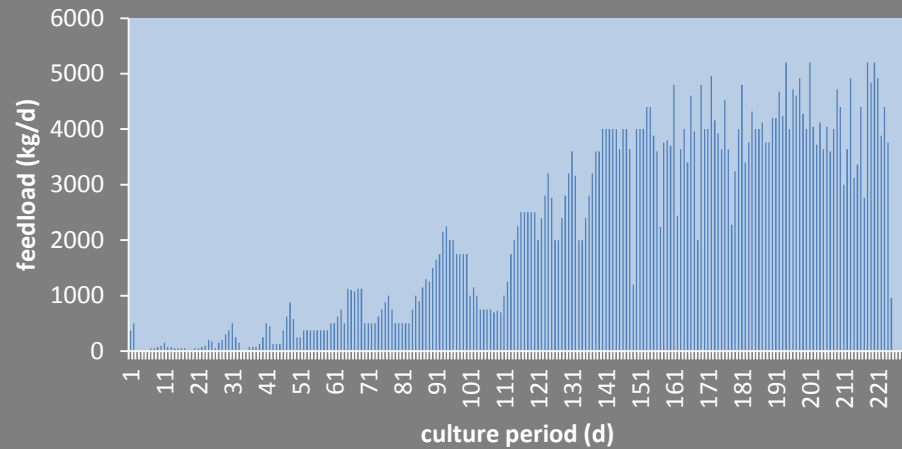
Parameter	Vinh Long- downstream Mekong river	
Pond number	10	12
Pond area (m ²)	11,721	10,504
Water depth (min-max)	2.23-4.25	1.97-4.1
Number for stocking (#)	730,000	470,000
Initial BW stocking (g.ind ⁻¹)	45.5	46.5
Initial biomass (kg/pond)	33,178	21,840
Initial density (kg/m ²)	2.83	1,85
Harvest		
Final density (kg.m ⁻²)	32.7	27.4
Final biomass (kg/pond)	383,316	322,364
Mean final BW (g.ind ⁻¹)	781	801
Total feed (kg/pond)	496,970	475,780
FCR (kg feed/kg fish)	1,41	1,58
SGR (%.fish ⁻¹ . d ⁻¹)	1.2	1.25
Survival rate (%)	67.2	85.6
Culture period(d.crop ⁻¹)	238	228

Feedload in ponds

POND 10 -VINH LONG



Pond 12- Vinh long



Sampling program

- **For water balance: daily measurement of input and output cover full production cycle**
- **For nitrogen, phosphorus and carbon budgets: biweekly measurement TN, TP and TC of input and output following full production cycle**



Analysis & Calculation

Input	Method
Water filling for stocking	Water depth * surface area
Intake water	Water depth * (after – before) * pond surface area
Rain water	Raining Gouge
Infiltration water	Different water level in PVC pipe
Runoff water	Water catchment frame of 1m ² * runoff area
Fingerling	Biomass * % nutrients in whole fish
Feed	Quantity * % nutrients

Output	Method
Water discharge	Water depth * (after – before) * pond surface area
Evaporation water	Evaporation chamber
Drained for harvest	Water depth * (before – after discharge) * pond surface area
Sludge removal by Frequency	Sampling calculate water and analysis nutrients
Seepage water	Different water level in PVC pipe and analysis nutrients
Fish harvested	Sampling analysis of nutrients * biomass harvest
Sludge accumulation	Sludge analysis for nutrients and sludge quantity in pond

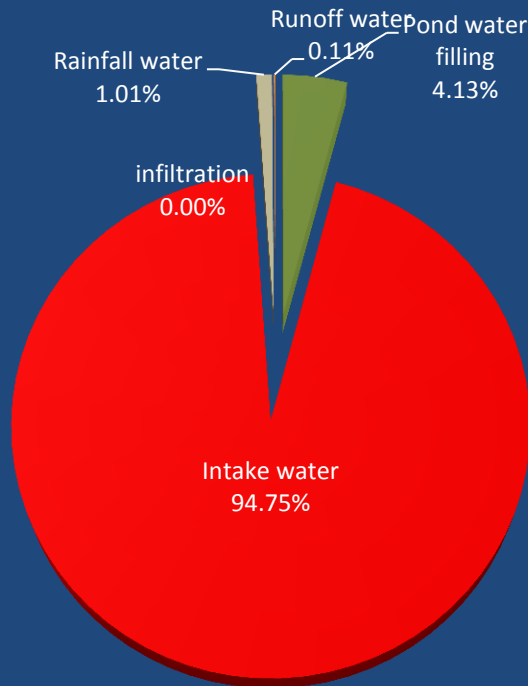
Result

1. Water budget

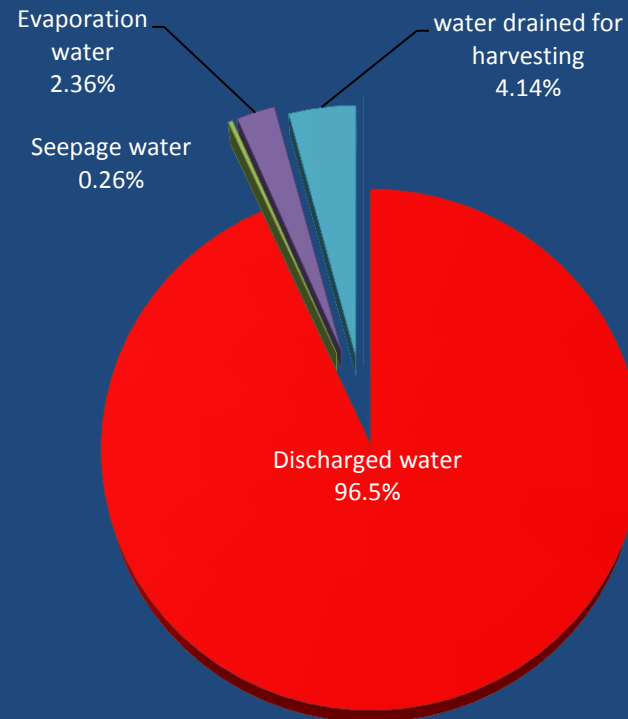
Input	m ³
Pond water filling for stocking	33,900 ± 2,078
Intake water	777,530 ± 31,523
Rainfall water	8,274 ± 3102
Runoff water	815 ± 470
Infiltration water	0
Total	820,737 ± 37,352
Output	
Discharged water	792,030 ± 32,475
Seepage	2,250 ± 383
Evaporation	20,037 ± 204
Water drained for harvest	35,137 ± 2,899
Total	881,504 ± 106,437
Water consumption per kg of fish produced(m⁻³.kg)	2.18
Water consumption per kg of feed (m⁻³.kg)	1.87

Result

How is water used in traditional striped pangasius pond ?



Water input

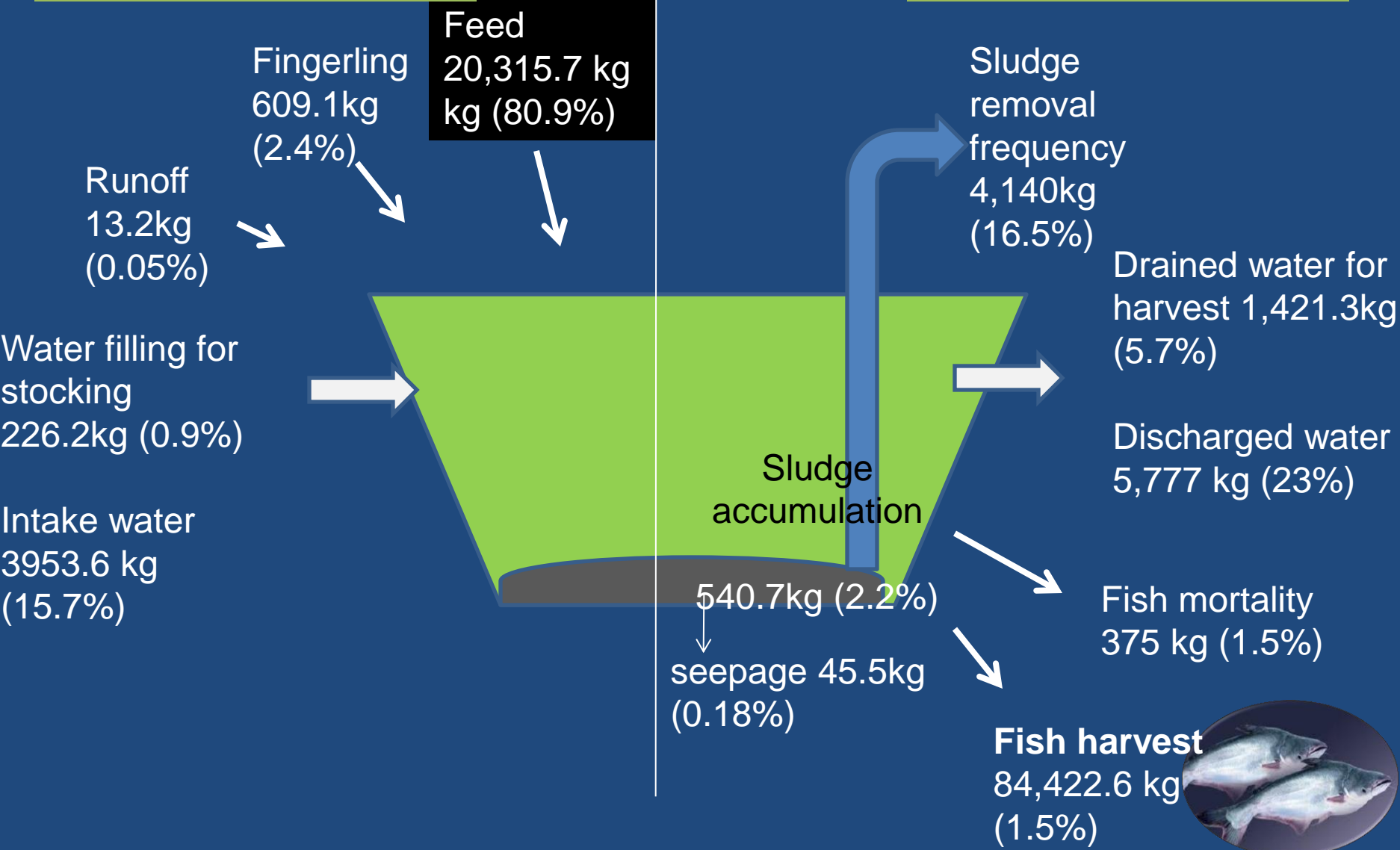


Water ouput

How is nitrogen balance in pond?

Total nitrogen input:
25,117.4 kg (100%)

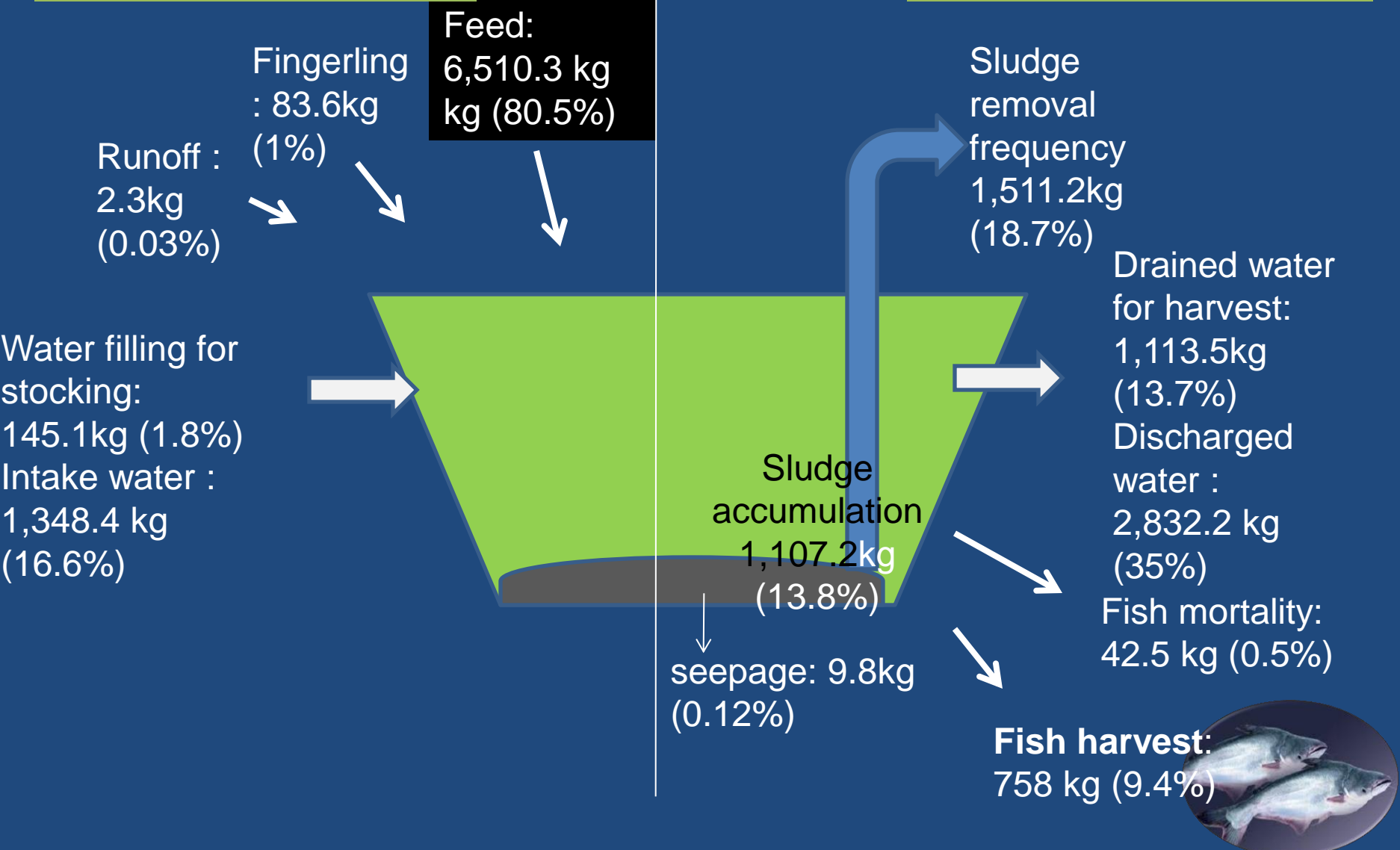
Total nitrogen output:
24,007.2 kg (95.8%)



How is phosphorus balance in pond?

Total phosphorus input:
8,089.5 kg (100%)

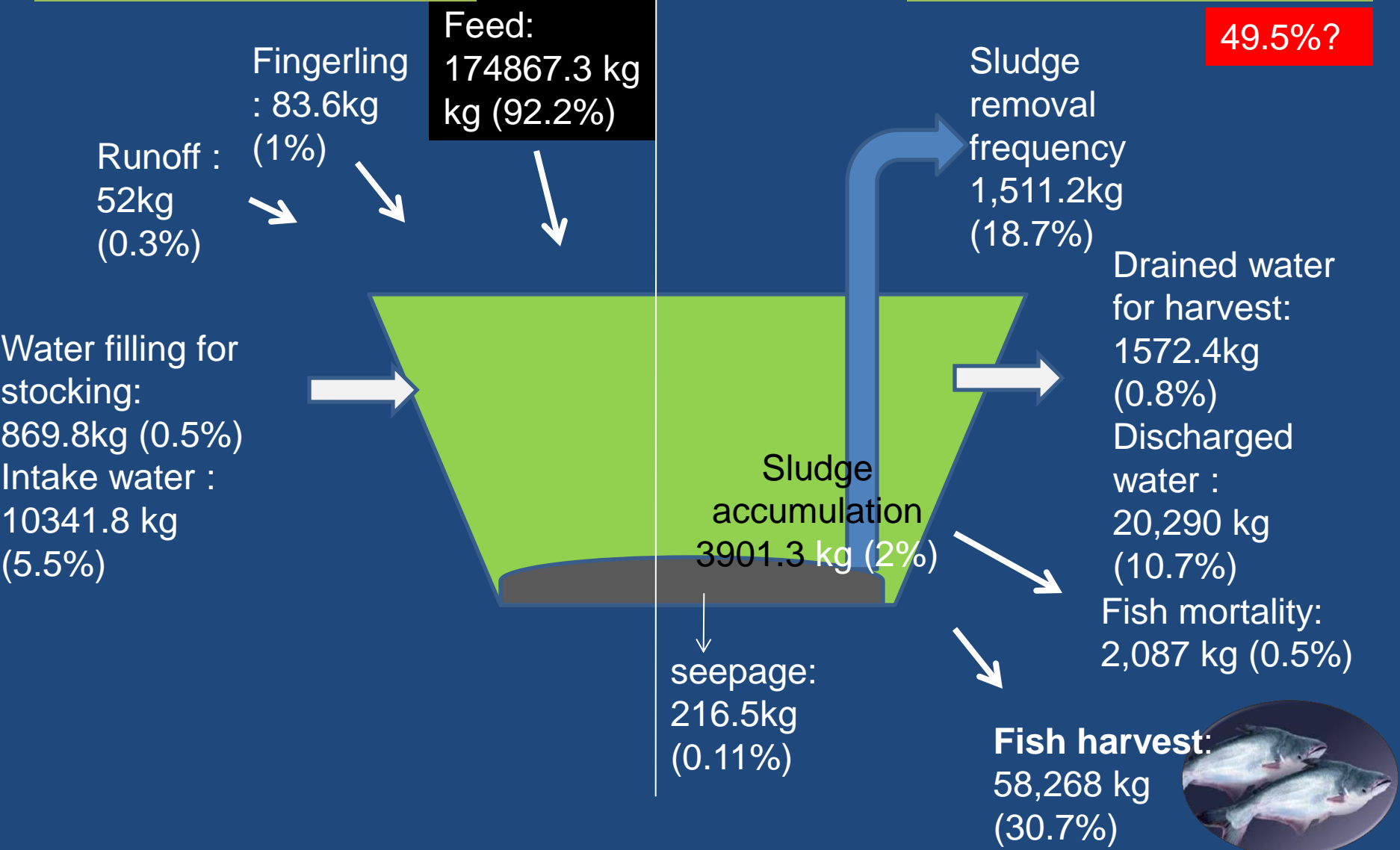
Total phosphorus output:
7,376.9 kg (91%)



How is total carbon balance in pond?

Total carbon input:
189559.2 kg (100%)

Total carbon output:
94,669.8 kg (50.5%)





Thank you very much

Question ?