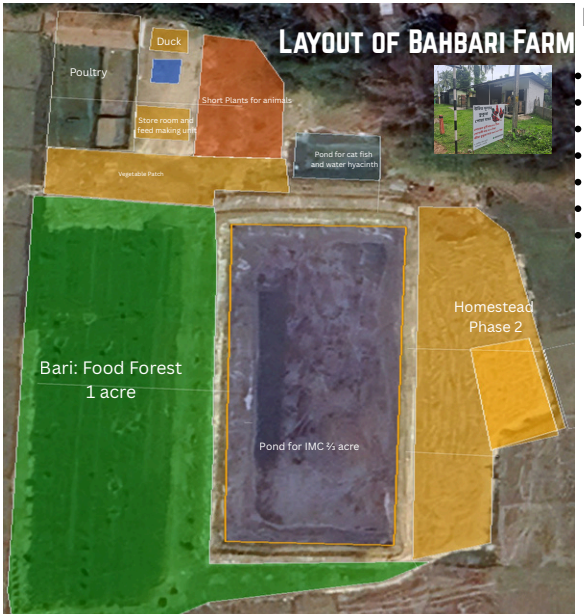
I will take just two minutes to talk about Bahbari farms.

In November 2023 we started work on the farm. The farm is still very young.

We wanted a design which would take into account these following factors:

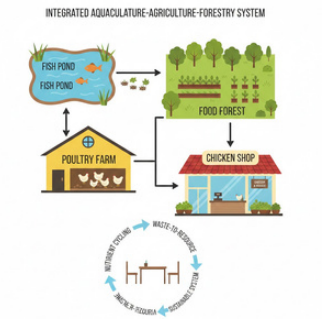
Climate Change (adaptation)
Good food (free of antibiotics and chemicals)
Nutritional food (feed and soil determines nutrients in food)
Reduce, reuse and recycle waste.
And housing with low embodied energy



Phase 1: What do we have in the farm?

- Poultry unit with local breeds
- Local ducks
- Two fish ponds
- Small pond 1/15 acre
- Big pond ⅔ acre
- A permaculture food forest (Bari)
- A shop to sell poultry (and fish in in the future.)

Only 3 acres, the average size of farms in India



But what does circularity and integration mean?

Meaning of Circular: Like a circle, where everything comes back to the point where it started.

In a farm, circularity means every resource that is generated is used, reused and recycled so that there is very little or no waste.

A circular farm needs to be fully integrated or interconnected so that everything is dependent on one another.

In a circular and integrated farm waste of something is feed for something else.

Eg: Chicken droppings is a good fertiliser for the pond and the trees.

Poultry litter to fertilise the pond

Water hyacinth as feed for poultry

Food and medicinals from the forest

Fish and chicken for selling

Water hyacinth as fertiliser and mulch for the forest

Nutrient rich water as fertiliser/water harvesting

Poultry litter to fertilise the Forest

Poultry feathers and waste for compost

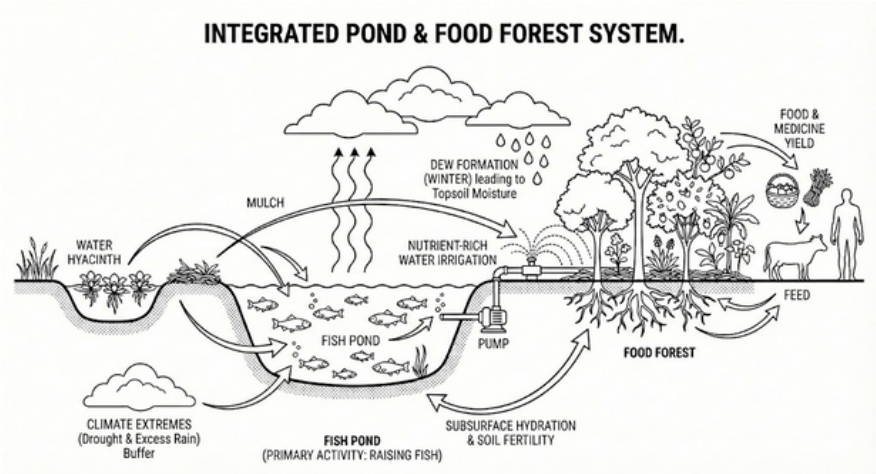
Everything is interconnected:

The fish pond is the farm's biggest asset.

The primary activity of the pond is to raise fish

But there are co-benefits:

- A great tool to combat climate change extremes (drought and excess rain)
- The pond provides the food forest with nutrient rich water
- Subsurface hydration leading to increased soil fertility and water harvesting
- Dew formation in the dry winter months, leading to topsoil moisture.
- Water hyacinth in the small pond gives us mulch (and also feed)
- And the trees and the plants give back food and medicine for animals.
- The food forest is our second greatest asset.



Generated using Google Gemini

The Pond is our Best Friend

Because of the pond the food forest is growing fast

The food forest for humans and animals:

The idea is to create an intensive regenerative production system that takes care of:

- Food for humans and animals (including for fish)
- Medicines for humans and animals
- Home-use products like soaps, detergents, cleaners, mosquito repellents etc
- Flowers, leaves and fruits used in religious ceremonies

But most importantly create an ecosystem, where nature does the work. (Birds, Animals, Reptiles, Insects, Microbes)

No mono-culture

Food forest grown the permaculture way (permanent agriculture) We use a design called Forest Floor Way™ *

Currently there are over a 100 different types of plants in the farm.
From tall trees to short plant to leafy greens to creepers and climbers to tubers
Each plant fulfills a certain requirement

*Developed by Clea Chandmal from Goa

This young food forest has over 100 varieties of plants that can be used as food or feed

Plant based protein from a food forest

Most of the nutritional requirements can be managed from a food forest.

Currently most common protein source in commercial fish feed is Soyabean.

Although cheaper than Fish Meal, it adds to the overall cost of feed.

But how many different varieties of proteins sources can be grown in a food forest?

Moringa >24% | Sweet Potato leaves > 20% | Napier>24% | Mango>20% | Duckweed 20-40%

% by Dry Weight

This is just to illustrate. The list can go on and on.
The protein content in all edible leaves increase once dry.

Similarly Carbohydrates...

Currently corn accounts for 90% of all carbohydrates in fish and animal feed

But can a food forest become a source of carbohydrates in feed?

Lets take a look at different sources:

Sweet Potato>20 gms

Veg Banana>24gms

Taro 30 gms

Yam 25 gms

Breadfruit 30 gms

Per 100 gms

There are many such examples of carbohydrate rich alternatives to corn.

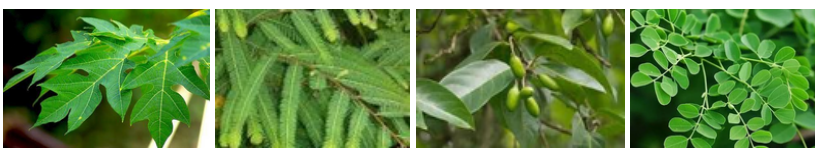
All the micronutrients too:

Papaya leaves: Vitamin C, Vitamin A, calcium, potassium, magnesium, and iron

Indian gooseberry (amla) leaves: Antioxidants, Fibre, Vitamin C, calcium, iron, and potassium

Terminalia chebula (Haritaki) : Potassium, Manganese, Iron, Copper, Selenium

Moringa leaves: vitamins (A, C, B-complex), iron, magnesium, calcium, potassium



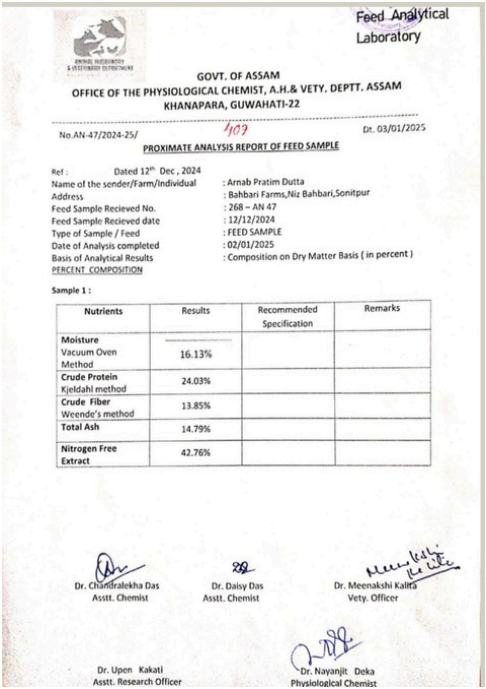
These are just few plants, the list is actually endless.

What goes into making a healthy and nutritious feed?

The ingredients in this photo are:
Front row, left to right: Turmeric, leaves of (Amla, Papaya, Haritaki, Elephant Apple
Middle row, left to right: Arjuna bark, Mango leaves, coriander, onion rice polish, wheat bran
Last row, left to right: Leaves of (Guava, sweet potato, carambola), garlic, cow dung, deoiled mustard cake, dried fish)

The feed is made by drying the leaves.

We are also exploring alternate sources of protieins. A small BSF unit in the farm.



Feed Analytical Laboratory

GOVT. OF ASSAM
OFFICE OF THE PHYSIOLOGICAL CHEMIST, A.H.& VETY. DEPTT. ASSAM
KHANAPARA, GUWAHATI-22

No.AN-47/2024-25/ 107 Dt. 03/01/2025

PROXIMATE ANALYSIS REPORT OF FEED SAMPLE

Ref : Dated 12th Dec , 2024
Name of the sender/Farm/Individual : Arnab Pratim Dutta
Address : Bahbari Farms,Niz Bahbari,Sonitpur
Feed Sample Recieved No. : 268 – AN 47
Feed Sample Recieved date : 12/12/2024
Type of Sample / Feed : FEED SAMPLE
Date of Analysis completed : 02/01/2025
Basis of Analytical Results : Composition on Dry Matter Basis (in percent)
PERCENT COMPOSITION

Sample 1 :

Nutrients	Results	Recommended Specification	Remarks
Moisture Vacuum Oven Method	16.13%		
Crude Protein Kjeldahl method	24.03%		
Crude Fiber Weende's method	13.85%		
Total Ash	14.79%		
Nitrogen Free Extract	42.76%		

Dr. Chandralekha Das
Asstt. Chemist

Dr. Daisy Das
Asstt. Chemist

Dr. Meenakshi Kalita
Vety. Officer

Dr. Upen Kakati
Asstt. Research Officer

Dr. Nayanjit Deka
Physiological Chemist

The feed that we are making given us satisfactory results.

We have the feed tested regularly with different ingredients

Our efforts are slowly getting recognised by the state government.

Thank you