WHY TILAPIA FOR INDIA?

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NEW DELHI

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INDIA HAS A NARROW FARMED SPECIES RANGE

Aquaculture species	Quantity
Indian Major carps (3 species)	3.11 million tons
Pangasius sp	600,000 tons
Shrimp	350,000 tons
Common carp & others	90,000 tons
Paccu	43,200 tons
Tilapia	15,000 tons

4.20 MMT

5 %

Based on FAO 2012 Data (2014)

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RECENT CHANGES IN INDIAN AQUACULTURE

Aspect	2010	2013/14	Change	Source
Shrimp seed	7 billion	20 billion	186%	ASHA
Shrimp production	160,000 MT	325,000 MT	103%	MPEDA
Shrimp feed	272,000 MT	572,000 MT	110%	USSEC
Shrimp feed installed	390,000 MT	1.33 MMT	241%	USSEC
Shrimp process	87022 MT	228,620 MT	162%	MPEDA
Shrimp revenue	2600M $	3210 M $	23.5%	MPEDA
Fish feed production	430,000 MT	684,000 MT	59%	USSEC
Fish feed installed	507,000 MT	1.55 MMT	206%	USSEC

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BUT WITH TILAPIA – WE HAVE NOT MADE THE REQUIRED CHANGE

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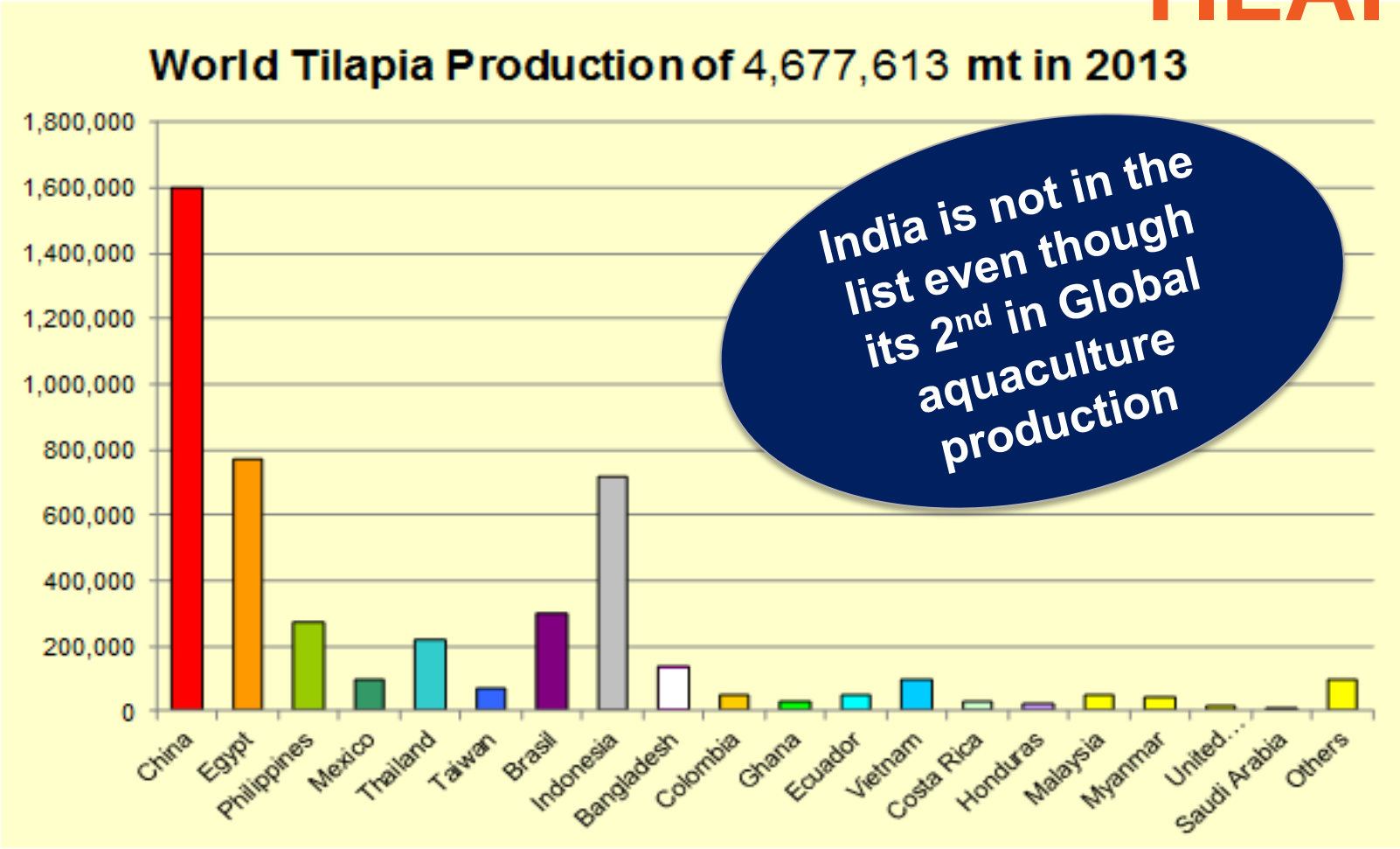
PRESENCE –ABSENCE OF TILAPIA



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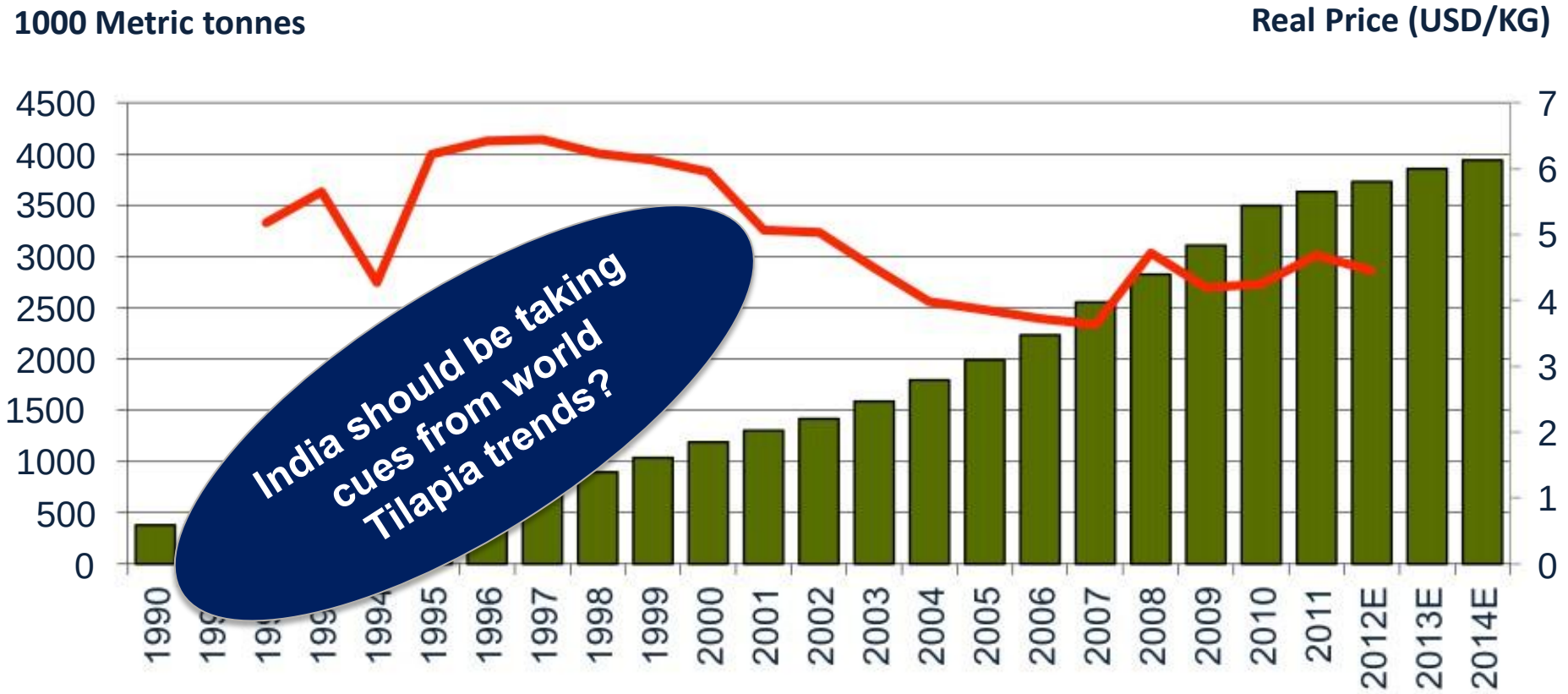
Tilapia

Global Aquaculture Production



Source: 1990-2010: FAO; 2011-2014: Kevin Fitzsimmons

TILAPIA IS A GOOD SPECIES FOR INDIA

Nile Tilapia

Mossambique Tilapia

Blue Tilapia

Red Tilapia

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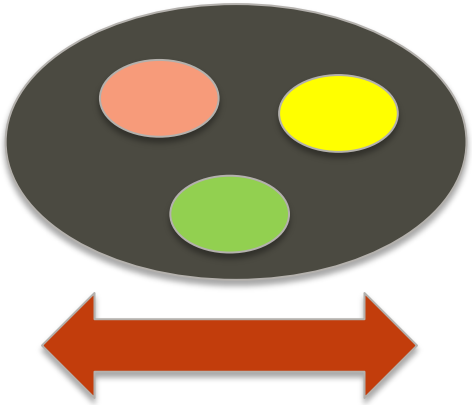
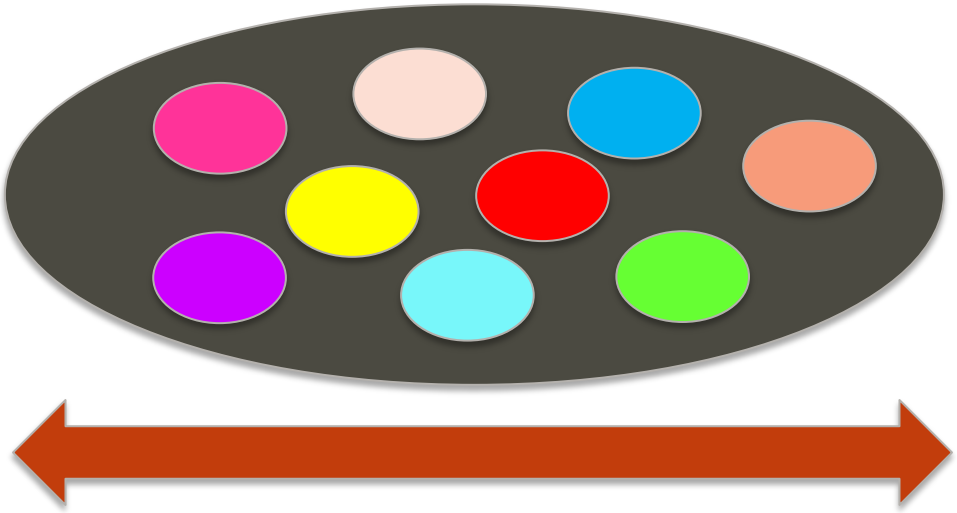
TILAPIA IS ONE AMONG MANY THAT CAN HELP BROADEN AQUACULTURE BUSINESS BASE



Relatively instable business; narrow range; no control on price, supply, demand and spread



Better situation to be in

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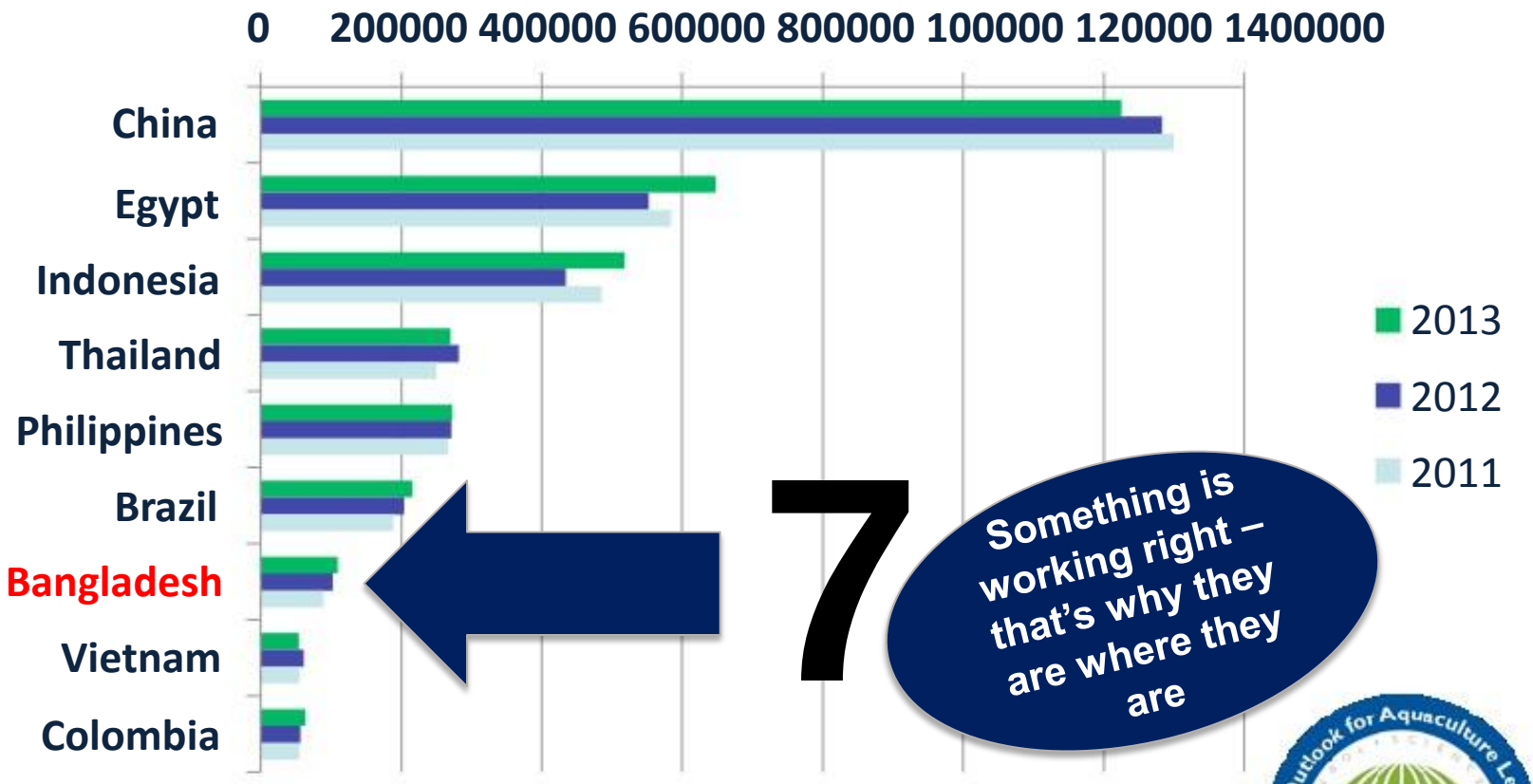
Tilapia

Production by Country



Average of estimates from several sources.

WHAT WOULD IT LOOK LIKE, IF INDIA PRODUCED TILAPIA IN PAR WITH BANGLADESH?

100,000 tons of production/Yr

120,000 tons of feed required/Yr

24,000 hectares of farmed area/Yr

240 million seed requirement/Yr

10,000 MT of Tilapia/month can keep ten - 40 TPD process plants in operation

Base criteria - USSEC

Parameter	Value
Production	8.7 tons /Ha
Survival	97%
FCR	1:1.2
Harvest wt.	550 g
Density	2/ Sq .m

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HOW MANY "TRUE" FED SPECIES DOES INDIA HAVE?

TOP FED FISH & CRUSTACEAN SPECIES GROUPS - 2012

	Top fed species	Tonnes	APR (95-12)	US $ billion
1	Chinese carp	12,473,313	5.6 %	20,383,704
2	Tilapia	4,506,877	11.5 %	7,656,117
3	Shrimp	4,327,520	9.5 %	19,428,752
4	Catfishes	3,909,218	15.3 %	6,150,739
5	Salmon	2,294,419	8.9%	11,263,000
6	Marine fish	2,181,032	8.5 %	9,440,033
7	Msc FW & D fishe	2,135,804	19.3%	6,378,675
8	FW crustaceans	1,827,313	18.4 %	10,481,207
9	Milkfish	943,259	5.7 %	1,711,500
10	Trout	878,985	4.9 %	3,790,573
11	Eel	241,285	1.5 %	1,372,848
	Top fed species	35,719,025	8.3 %	98,057,148

Calculated from FISHSTAT – FAO (2014)

India has 1,3,4 from this list of top ten; but tilapia is missing, which is second most popular fish next to carps.

Data source: Albert G.J Tacon; International Aqua Feed; Sept/Oct 2014

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THERE ARE REASONS FOR THESE TO APPEAR ON THIS LIST. IS INDIA WATCHING?

TOP FED FISH & CRUSTACEAN SPECIES GROUPS - 2012

	Top fed species	Tonnes	APR (95-12)	US $ billion
1	Chinese carp	12,473,313	5.6 %	20,38
2	Tilapia	4,506,877	11.5 %	7,656,117
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If a 17-year growth trend for the Tilapia has been in double digits; It is a good business position for India to be in

Data source: Albert G.J Tacon; International Aqua Feed; Sept/Oct 2014

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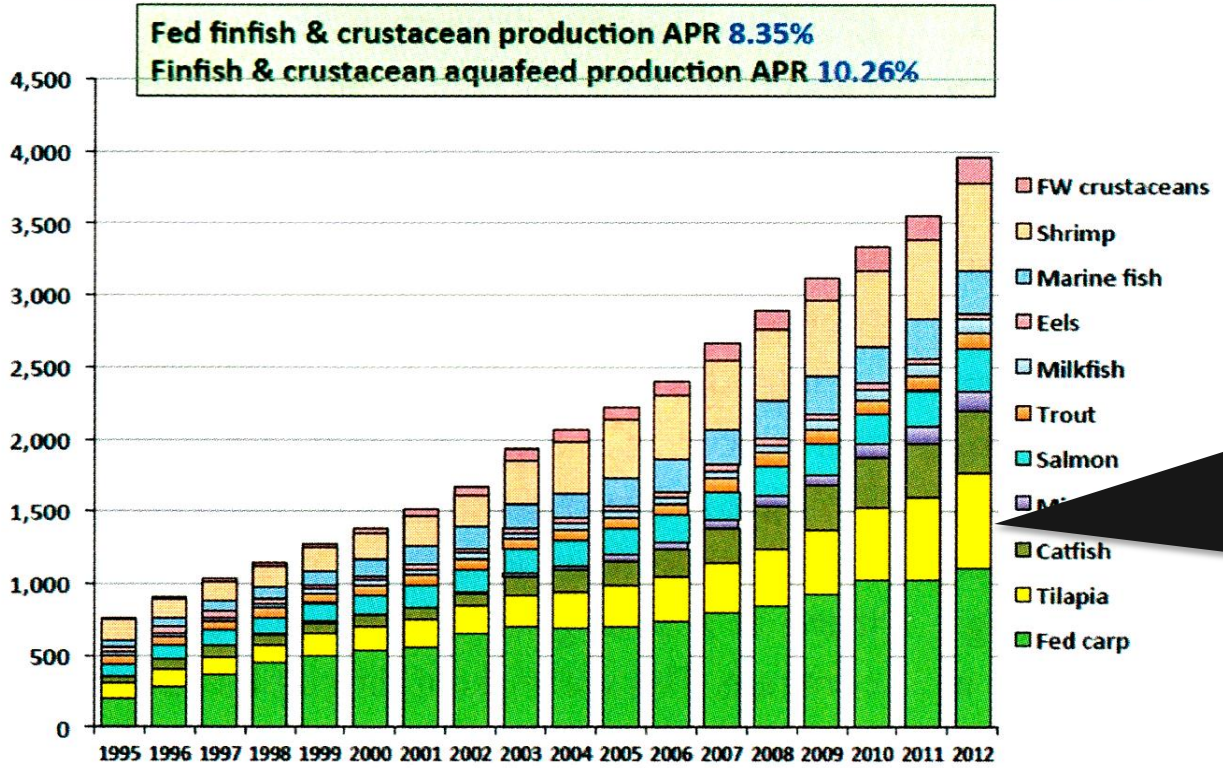
INDIA SHOULD BE CHASING THESE AQUA FEED TRENDS

Estimated aquafeed production by major species group (x 10,000 tonnes; 1995 – 2012)

Data source: Albert G.J Tacon; International Aqua Feed; Sept/Oct 2014



Take note of the pink, yellow (Tilapia) and the green color band for feed. India will soon follow the trend, though late

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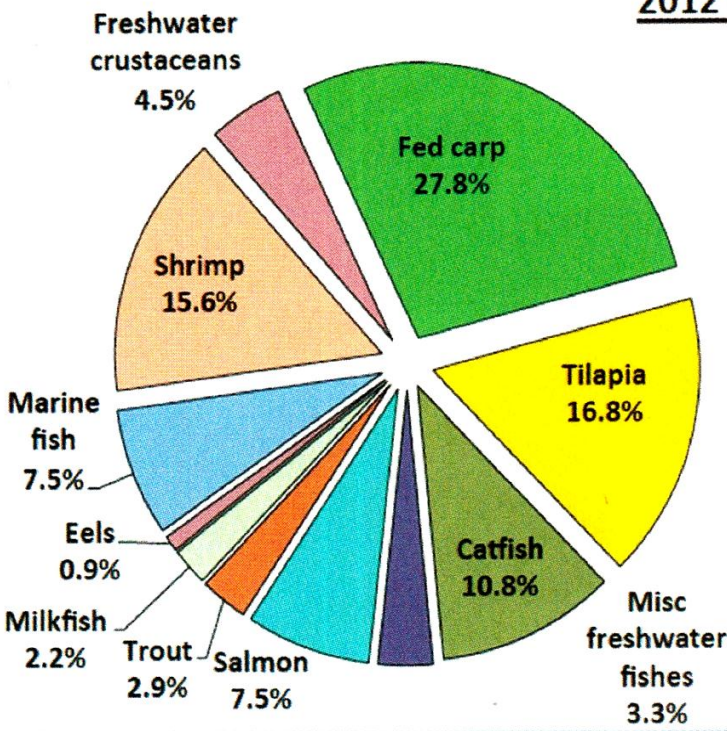
HOW IS THE WORLD DOING WITH TILAPIA FEED?

TOTAL COMMERICAL AQUAFEED PRODUCTION

Estimated at 39.62 million tonnes (Mt) in 2012, and expected to rise to 49.74 Mt by 2015, 65.40 Mt by 2020, and 87.14 Mt by 2025



2012 estimated feed production

Chinese carp	11.03 Mt
Tilapia	6.67 Mt
Shrimp	6.18 Mt
Catfish	4.27 Mt
Marine fish	2.98 Mt
Salmon	2.98 Mt
FW crustaceans	1.80 Mt
Oth FW & D fish	1.31 Mt
Trout	1.14 Mt
Milkfish	0.89 Mt
Eels	0.37 Mt
Total	39.62 Mt

Tacon et al. 2014

17% of world aqua feed with an actual volume of 6.67 MMT feed goes for Tilapia

Is more than shrimp feed that is milled

Data source: Albert G.J Tacon; International Aqua Feed; Sept/Oct 2014

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INDIA HAS READY/EXCESS FEED CAPACITY BUT NOT ENOUGH FEED TAKING SPECIES

- 1.47 MMT TOTAL INSTALLED
- 684,000 MT SOLD IN 2014
- 47% CAPACITY UTILIZATION
- 1.24 MMT @ 85% MILL EFFICIENCY
- GAP/OPPORTUNITY 556,000 MT

We are advocating Tilapia as one good species that can utilize this opportunity

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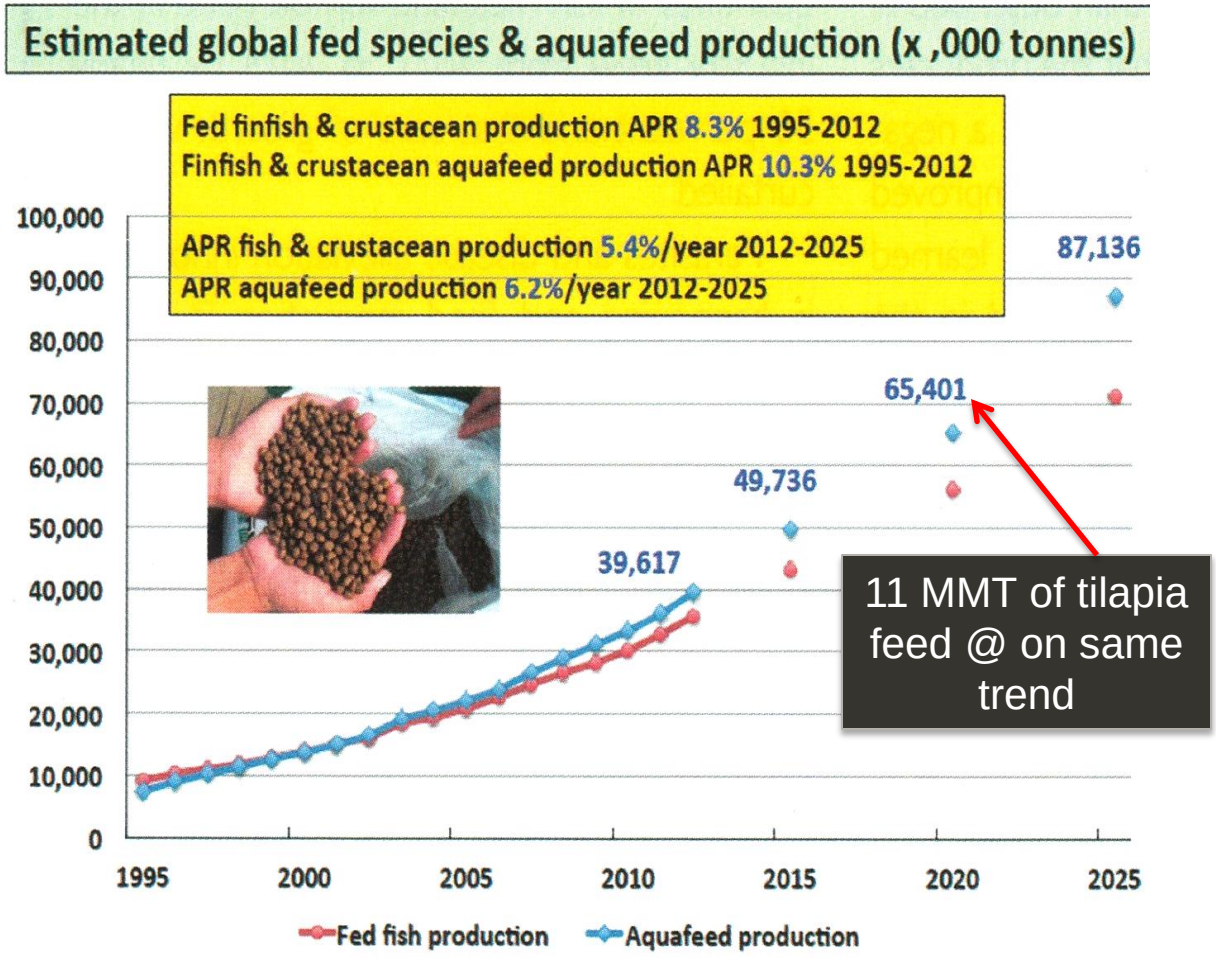
LOOKING BEYOND 2015



If these are projected trends for fed fish and corresponding aqua feed production trends– India ought be there soon

Better late than never

Tilapia will maintain its relative position

Data source: Albert G.J Tacon; International Aqua Feed; Sept/Oct 2014

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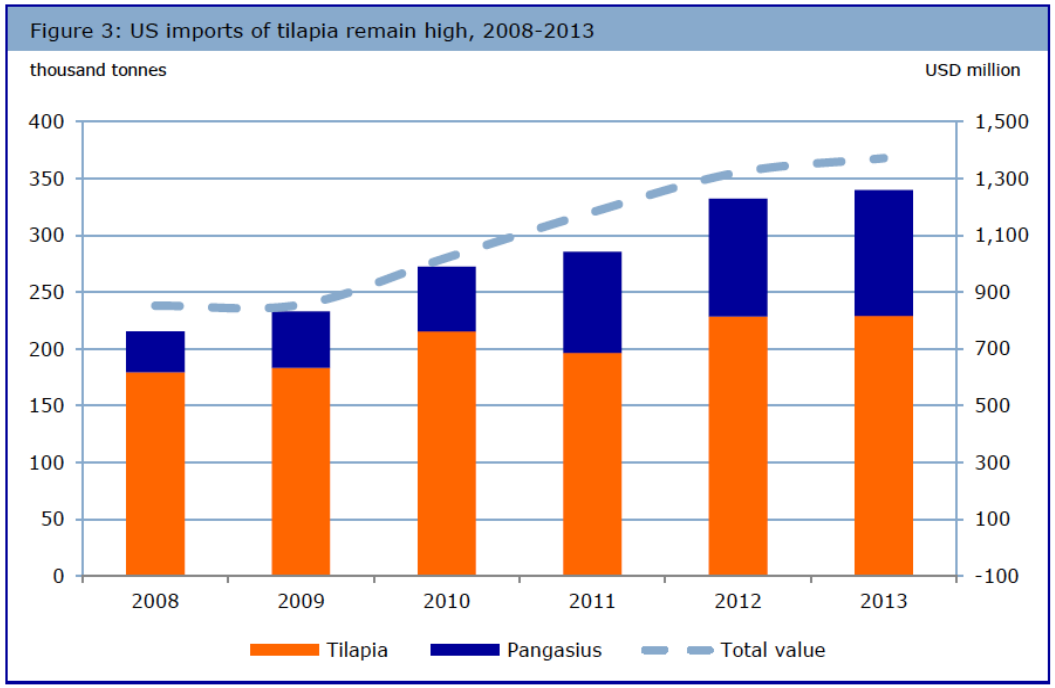
INDIA SHOULD NOT TO LOSE OUT ON TRADE AND REVENUE FROM TILAPIA

	2013	
	Species	Lbs
1	Shrimp	3.6
2	Salmon	2.702
3	Canned Tuna	2.3
4	Tilapia	1.43
5	Pollock	1.154
6	Pangasius	0.771
7	Cod	0.605
8	Catfish	0.566
9	Crab	0.548
10	Clams	0.352

Top 10 per capita consumption by species in U.S (National Marine Fisheries Service)
Total consumption =14.5 lbs



Source: National Oceanic and Atmospheric Administration, 2014

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TILAPIA FITS INTO INTEGRATION BUSINESS MODELS

- FEW COMPANIES THINKING ABOUT INTEGRATION
- END PRODUCT REVENUE IS FROM PROCESS PLANTS
- TARGET CUSTOMERS ARE THE YOUNG POPULATION OF INDIA
- BRANDING AND DISTRIBUTION LACKING
- OTHER SYSTEMS ARE IN PLACE
- POND AQUACULTURE TECHNIQUES FOR TILAPIA HAS TO BE MODERNIZED/INTENSIFIED

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IDEAL SPECIES FOR INTENSIVE POND AQUACULTURE

3 times more production; 20-25 MT/ha + bonus as un-fed fish, shrimp and waste @ some value

IPAT Technology standardized by Auburn University and USSEC; commercialization is on

HOW HAS INDIA DEALT WITH NEW SPECIES ?

500,000 MT in five years

New species have displaced existing carp farming area and volume

350,000 MT in three years

India can take Tilapia to such levels – its not difficult

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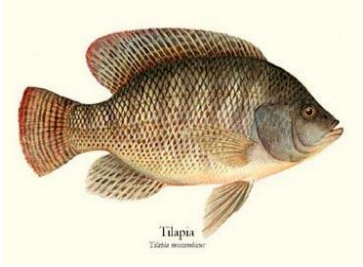
INDIA DID IT FOR BROILER CHICKEN , IT CAN DO FOR TILAPIA TOO



13 Generations - continuous improvement; world
RGCA (R&D) testing/holding India
Stock potential 25-30 satellite hatchery stations
Distribution and sale of fry

Not Established in India

Pure line GP Research & continuous development; world
GP testing/holding India
Parent stock distribution
Regional hatcheries (700)
Distribution and sale of chicks

Well Established in India

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USSEC DEMONSTRATES CONTINUOUSLY

DATA on 15 FW & 13 SW SPECIES

Parameter	Pond	Cage
Initial body weight	28 g	52 g
Harvest weight	525 g	577 g
Days of culture	131	150
Production	7.63 + 1.1	225.8 kg/m^3
Survival	97.50 %	98.25 %
FCR	1:1.19	1:1.34
ROI	36.40%	46%

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Farming the land to sustain the sea

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INDIA NEEDS A FISH WITHOUT INTER-MUSCULAR BONES – TILAPIA IS AN ANSWER.

One of the reason the Pangasius became popular in India is because of this trait. Isn't

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LETS INTROSPECT CUSTOMER PERCEPTION FOR TILAPIA

DEAR KEVIN,

I RECENTLY BEGAN USING FARM RAISED TILAPIA FILLETS. I BUY THESE IN INDIVIDUAL VACUUM SEALED PACKAGES IN ONE POUND BAGS AT WAL-MART. MY HUSBAND HAS DIABETES AND WE BOTH ARE VERY WEIGHT CONSCIOUS. THIS FISH IS THE PERFECT FOOD ITEM FOR US, I LOVE THE WAY IT IS PACKAGED, JUST USE WHAT I NEED FOR ONE MEAL. IT IS REASONABLY PRICED, ALWAYS AVAILABLE IN THE MARKET AND CONSISTENTLY HIGH QUALITY.

I LOVE THE PRODUCT!!!!

MARIAN BIRNIE AUG. 12, 2001

- Farmed
- Preferred product form
- Convenience pack
- Distribution cold chain
- Health quotient
- Family suitability
- Price
- Steady supply
- Quality consistency

This was said 12 years back

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INDIA HAS A POPULATION THAT CAN MAKE RAPID CHANGE

- 50% population < 25 yrs
- Has no time
- Has no patience
- Stress levels high
- Has spending power
- Too much knowledge
- Health conscious
- Modern living/style
- Open to experimentation

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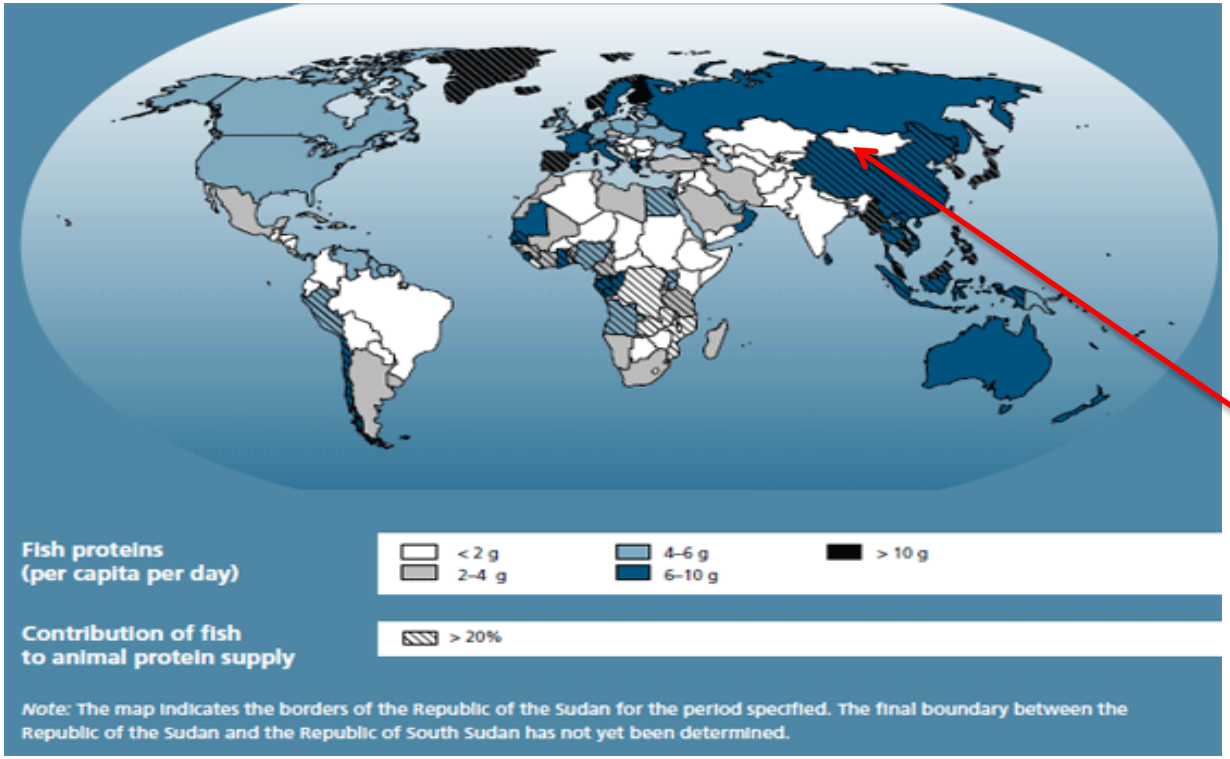
OPPORTUNITY – INDIA IS BLEAK ON USE OF FISH PROTEIN

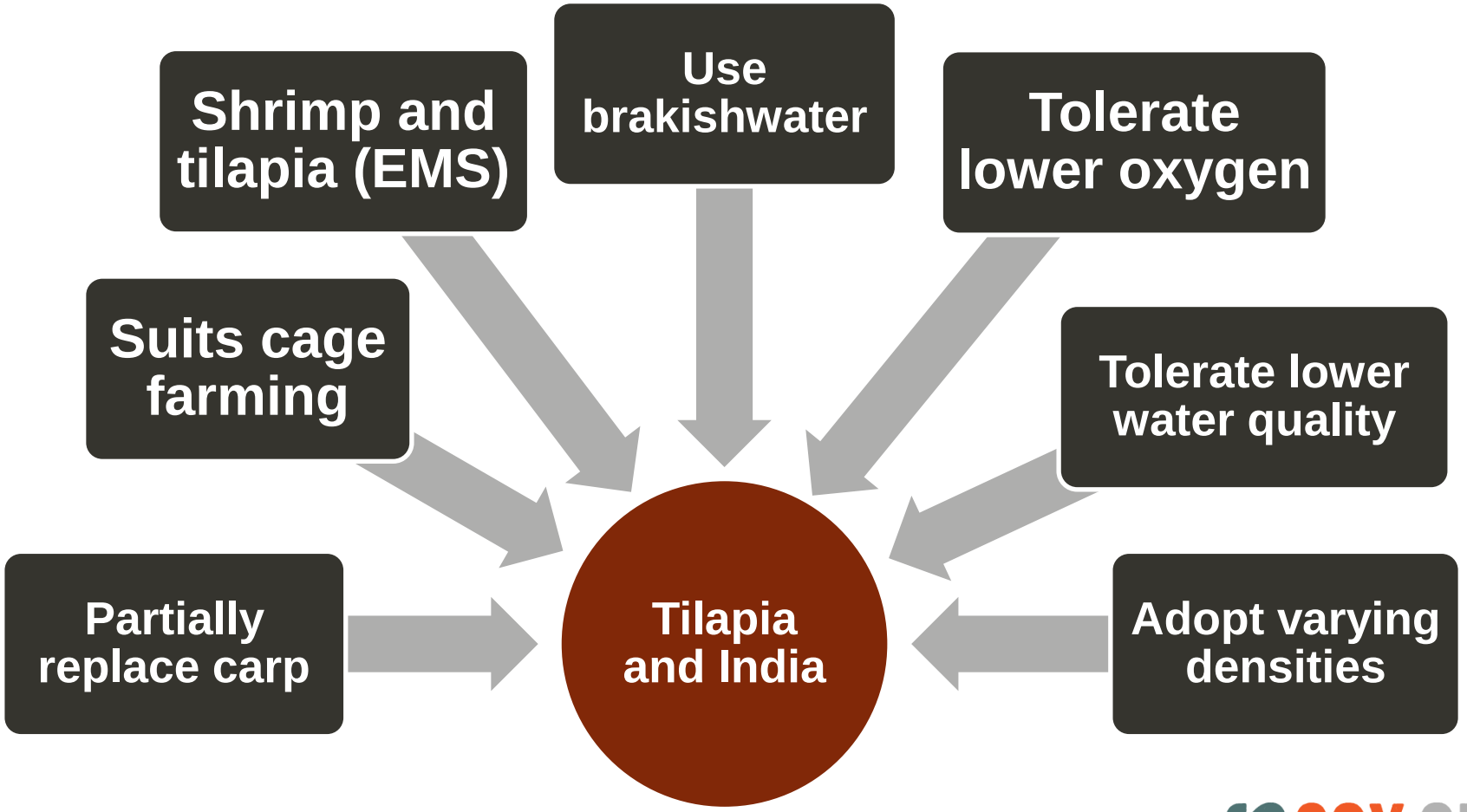


2nd in farmed fish production in the world and India ought to be doing better on consumption

A value chain constraint that can seriously hamper all our efforts

Chart source FAO 2012

HOW ELSE DOES TILAPIA FIT INDIA'S AQUACULTURE STRATEGY?



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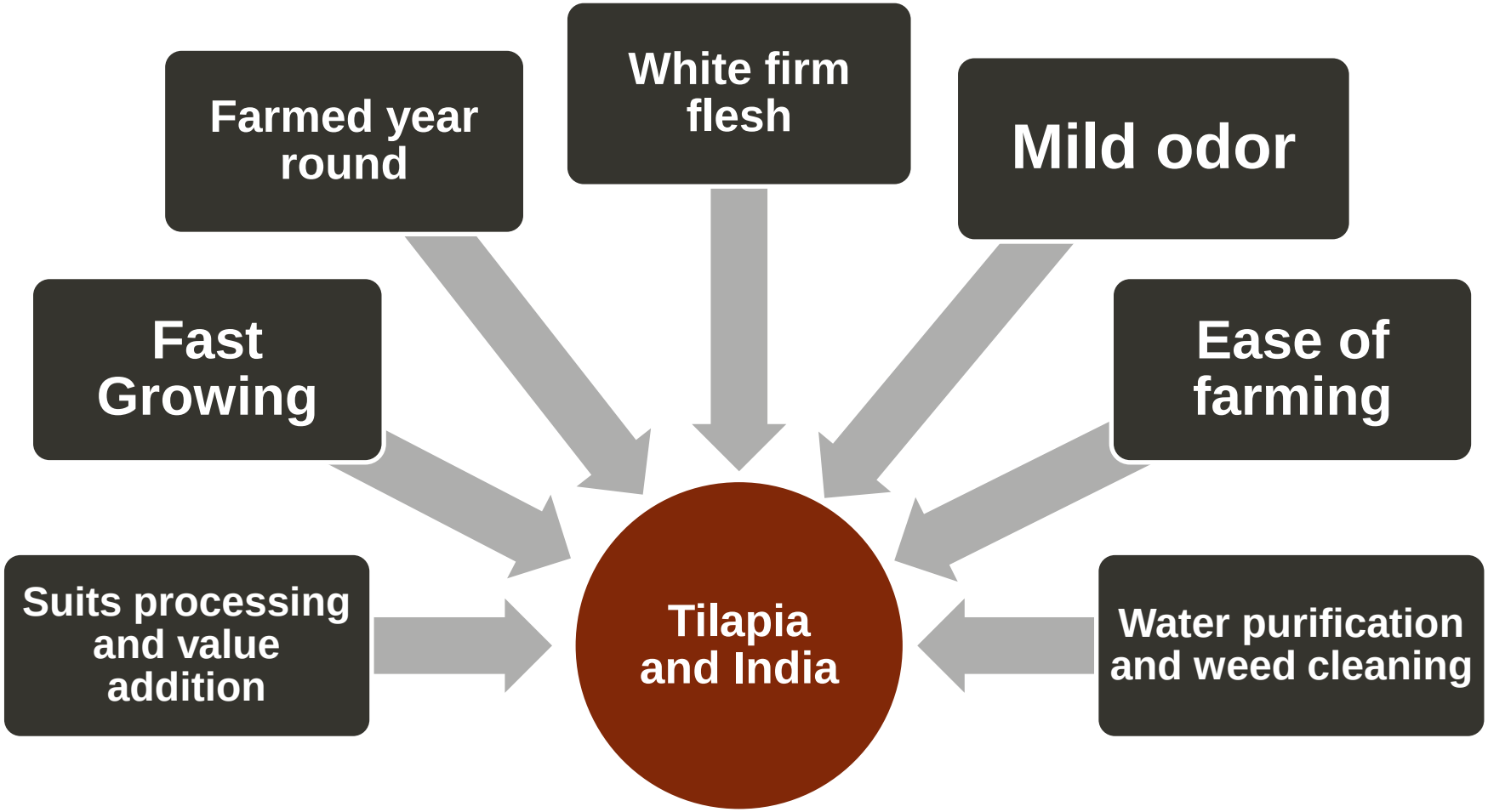

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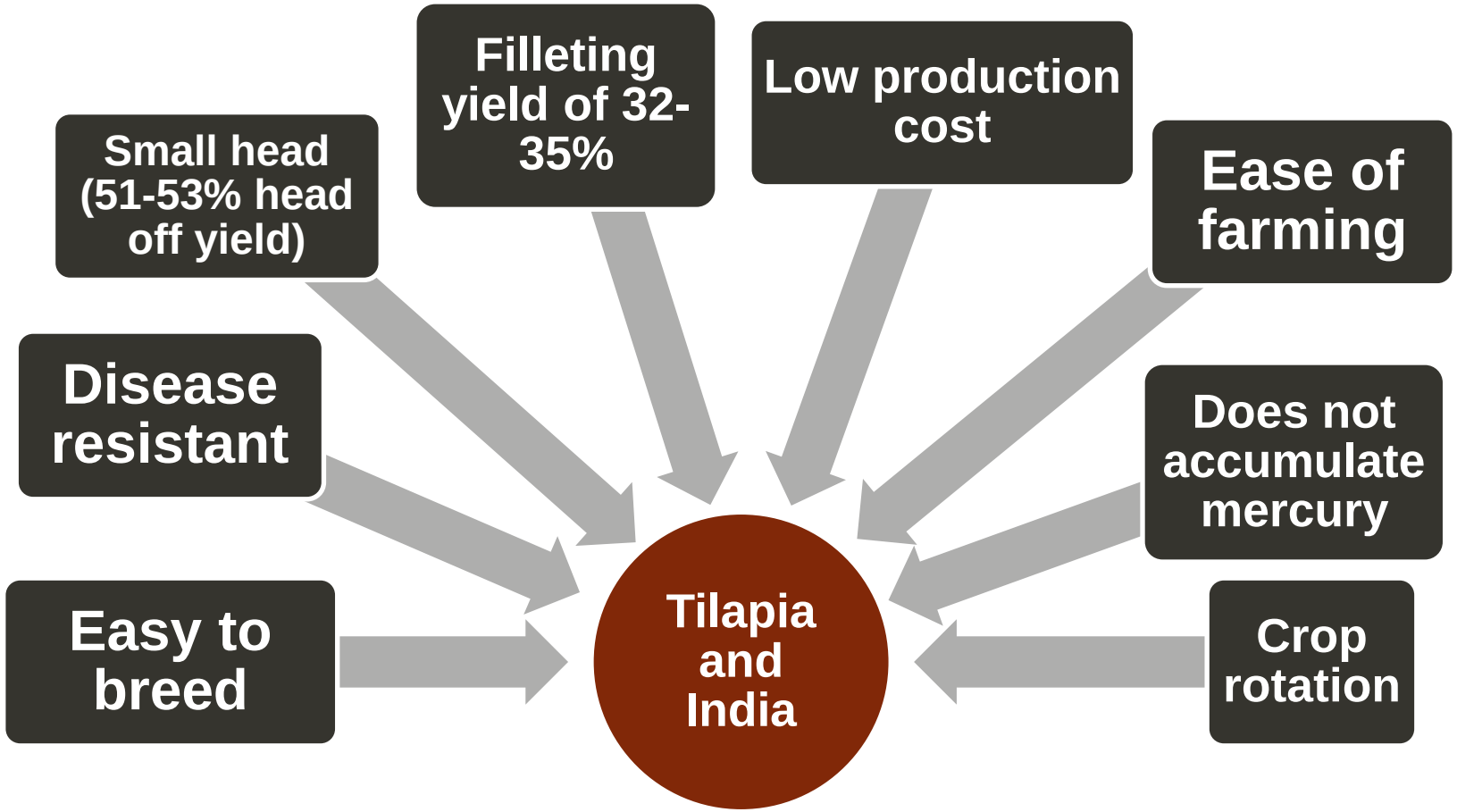
HOW ELSE DOES TILAPIA FIT INDIA'S AQUACULTURE STRATEGY?



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CONCLUSION

The 41 reasons listed - actually outweigh India's current position, understanding and attitude towards this species or the progress made so far.

I think there is no reason to go slow on this species; needs to be treated better; will be treated better

FINALLY THIS IS HOW THE WORLD DEALS WITH TILAPIA , INDIA WILL SURELY CATCH UP

There are reasons for this importance

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BOCA DEL RÍO • VERACRUZ • MÉXICO
International Symposium on Tilapia in Aquaculture

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4th International Technical and Trade

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WILL LEAVE YOU HERE WITH SOME THOUGHTS FOR INDIA

WAS A PLEASURE BEING AMONGST ALL OF YOU

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