Thailand's seafood supply to the world market has been between 1.7 and 2.0 million tons per year during the past 5 years

ton	2007	2008	2009	2010	2011	2012	2013	2014	2015
USA	339,547	348,146	377,149	402,060	359,241	303,862	244,041	239,864	218,223
Japan	289,282	276,005	275,370	288,382	297,669	290,316	246,830	246,710	241,162
EU	265,259	274,195	264,578	255,442	239,441	206,627	194,281	167,979	145,311
ASEAN	297,857	266,082	251,540	306,331	318,025	296,625	288,885	289,581	272,888
WORLD	1,956,185	1,907,057	1,874,853	2,058,354	1,974,965	1,908,099	1,741,845	1,793,306	1,683,386

→ fisheries 70%

→ aquaculture 30%

Aquaculture Production Thailand

2012	inland	coastal				
	fish	fish	**shrimp**	mollusks	other	total
Thailand	380,986	19,994	623,660	205,192	4,045	1,233,877
World	38,599,250	5,551,905	6,446,818	15,170,738	864,542	66,633,253
Thailand %	1.0%	0.4%	9.7%	1.4%	0.5%	1.9%

Shrimp Production Thailand ⬇ 2016 Q3

2016	ton	mTHB	THB/kg	$/kg	share
USA	56,845	20,469	360	10.29	40%
Japan	29,299	11,731	400	11.44	21%
EU	6,523	2,409	369	10.55	5%
China	3,757	1,228	327	9.34	3%
Σ	**96,424**	**35,837**			
Total	**141,141**	**47,599**			68%
	68%	75%			

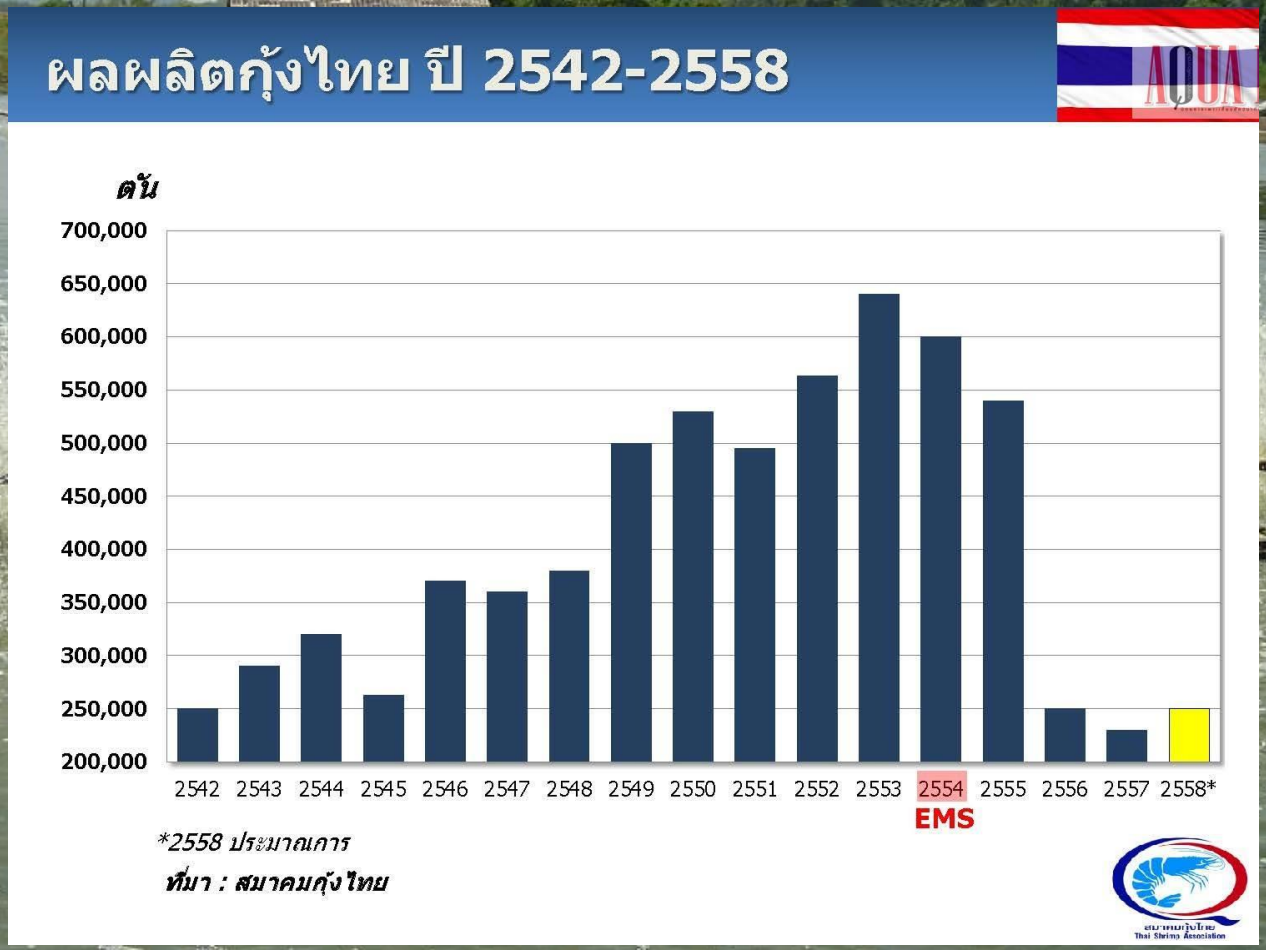
Thailand: shrimp nation – 64,000 ha

Due to the explosive growth of the **coastal aquaculture** industry during the last 3 decades, attention had to be paid to potential environmental hazards as a consequence of this development:

1. **Deforestation** and illegal occupying of mangrove areas for shrimp farming.
2. **Overexploitation of Black Tiger shrimp brood stock** without having an adequate conservation and population management program in place.
3. **Disease epidemics** associated with mismanagement, including the improper application of chemicals and antibiotics.
4. Massive **increase of waste** from ever increasing intensification of farm operations.
5. Not enough efficient **sea water supply, treatment and effluent systems**.

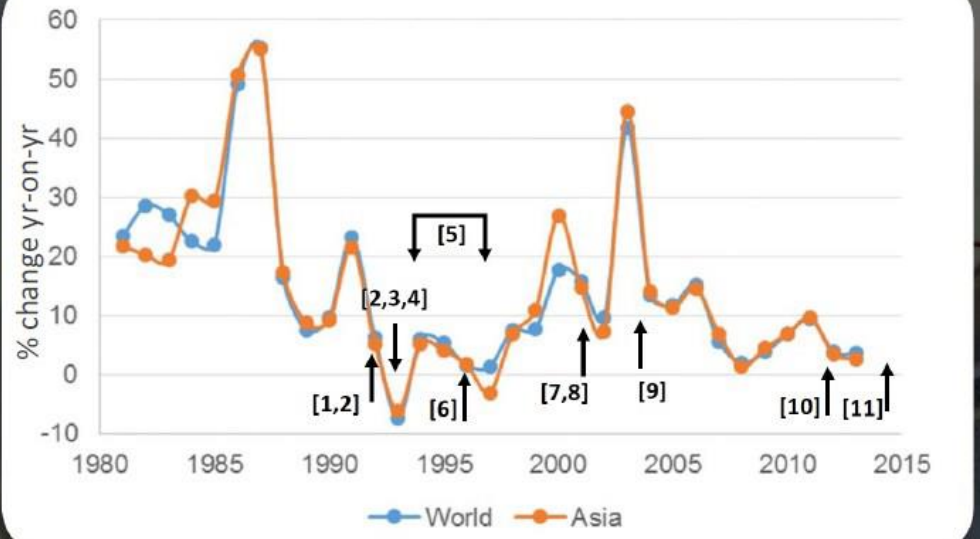
TROUBLED WATERS

Thai shrimp production 2542-2558



... YHV ... WSSV ... EMS ... EHP ...

TROUBLED WATERS



Costs of shrimp disease

1. US$ 0.3 B: YHV and WSSV in Indonesia;
2. US$ 30-40 M p.a.: YHV in Thailand;
3. US$ 0.5 B: WSSV in China;
4. US$ 100 M: WSSV, YHV and MBV in Vietnam;
5. Losses in Thailand due to WSSV and TSV rise from US$ 240 M to 650 M p.a.;
6. US$ 160 M p.a.: WSSV in Sri Lanka;
7. US$ 25 M: WSSV in Malaysia;
8. US$ 80 M: WSSV in India;
9. US$ 0.4 B: All shrimp diseases;
10. US$ 3 B : "AHPND" in Thailand. Exports down 32% year-on-year. The value has declined by 17% to US$ 1.16 B;
11. US$ 5 B: Loss due to AHPND in Thailand.

Andy Shin and Don Griffiths, TARS 2016

US$ 20 billion

What has been done, … ongoing

1. **Conservation of mangrove** forests.
2. Introduction of **domesticated White shrimp** and shrimp **breeding** programs
    - Better control of husbandry
    - Better control of diseases (?)
3. **QC labs** in every coastal aquaculture province
    - Antibiotics
    - Disease screening, etc.
4. **Registration** of farms and full **traceability** of products
    - **GAP** and **CoC**
    - **M**oving **D**ocuments, …
5. Legislation and **regulations** RE farm **waste treatment** and removal

Where are we today … how to carry on

1. Improve what we have: *P. vannamei*

PRODUCT THAT IS …
SUSTAINABLE – ENVIRONMENT FRIENDLY - (COST) EFFICIENT - HEALTHY & SAFE

Where are we

RAS + zero water exchange

- Production:
  - Outdoor 3.0 kg/m²
  - Indoor 4.5 kg/m²
- PL efficiency: 21 ton/mlnPL
- Cost of production: 3.3 $/kg (up 15-20% vs 5 years ago)

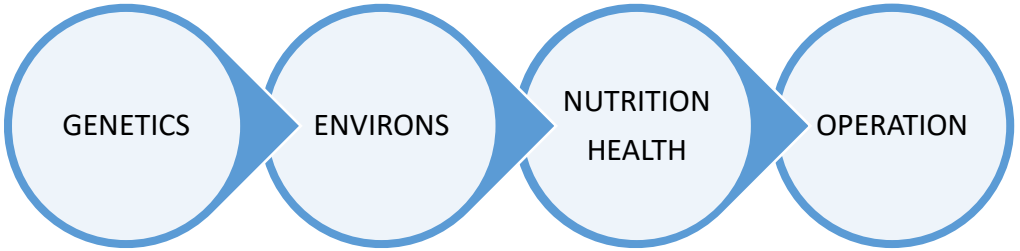
1. Improve what we have: *P. vannamei*

Where are we going

- Improve yield per crop
- Improve consistency ⇐ eliminate epidemics

Need

HOLISTIC approach



→ topics:

- Genetics + epi-genetics
- Microbiology:
  - study/control microbiome
  - re-use of shrimp waste
- Nutrition:
  - animal requirements (e.g. protein)
  - raw material selection
- Understand diseases
- Effect of climate change
- Culture systems:
  - Indoor
  - Multi-phase systems: nurseries
- C-footprint, …

2. Species differentiation

Cope with risks and hazards of mono-culture

- Culture sustainability/productivity (polycultures, anabas (climbing gourami) in south

Prepare for market dynamics

- Supply/demand > pricing > cost effectiveness
- Efficient production technology for tropical species in temperate climates available

Broader use of available resources

Need

- **Study/develop market for end product**
- Culture technology
- Logistics present

3. Legislature et all.

Trade barriers

- **G**eneral **S**ystem of **P**references, **F**ree **T**rade **A**greements, …

  $\Rightarrow$ Competitiveness of Thai products in EU market

Rules and regulations

- Production of animals
  - Use and development of “F1” genetic stocks
- Production of feeds, etc.

Certification (GAA, etc.)

- 1 Global body/system

Coordinated effort to improve international press image

THAILAND platform

- Platform Management:
  - Dr. Oopatham Pawaputanon:
    - former Deputy DG Department of Fisheries, present advisor DOF
  - Erik Van Ballaer:
    - INVE Technical Support Asia
  - X coordinator:
    - day-to-day coordination … to be hired
- Platform Nucleus:
  1. Public DOF:
     - country policy
     - research different species
  2. Private Thailand Frozen Food Association:
     - EU contact + business
  3. Private Surathani Shrimp Association:
     - largest and most influential SAA
  4. Private CPF:
     - Country trend-setter aqua production: shrimp & fish

THAILAND platform

- Platform Group
  1. Public DOF
  2. Public NACA
  3. Public Mahidol University
  4. Public Kasetsart University
  5. Public Prince of Songkhla University
  6. Private Thailand Frozen Food Association
  7. Private Surathani Shrimp Association
  8. Private Chantaburi Shrimp Association
  9. Private Thailand hatchery Association
  10. Private Thailand Feedmill Association
  11. Private CPF
  12. Private INVE/Benchmark

  … other public/private entities to be defined