Natural Resource Extraction Curses: Observations from Dune’s Spice and Red Lobster’s Shrimp

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Natural Resources should be a blessing, but...

Struggles over resources a topic theme across disciplines:

--Environmental studies: what quantity of product? *Sustainability*

--Economics and social sciences: use of the rents (profits) key, may lead to economic growth or stagnation, dependent upon distribution of production assets, corruption, rent-seeking behaviors around natural resources; exports...

So, what are the outcomes for present and future generations of gatherers of non-timber forest products? What lessons?
Lessons from Dune’s Spice of the Future and Red Lobster’s Shrimp of the Past

1. Why is this raw material important?
2. What are the production/extraction patterns?
3. What are the apparent distribution benefits/costs across society?
4. Extensions for ecological sustainability
Dune’s Wild Desert’s Wealth: Spice

Buyers use drug!!
Shrimp Farming’s Wild Mangrove Wealth: Seed

northbiomes.weebly.com
fineartamerica.com

travel.guardian.co.uk
earthjournalism.net

Shrimp exports, domestic consumption
Red Lobster’s (and other firms’) Shrimp

Diagram:
- Wild broodstock (♀ ♂)
- Maturation tank (1-3 months)
- Spawning tank
- Eggs (external fertilization)
- Hatching (8-12 hrs)
- Nauplii
  - Nauplii (1.0-1.25 days)
  - Protozoa (2.9-3.5 days)
  - Mysis (2.9-3.5 days)
  - Postlarvae (9-12 days)
- Larval nursery rearing tank (PL 20)
  - (30 days)
- Postlarvae
  - Seawater (30-35 ppt)
  - Stocking 20-25 PL/m²
  - Semi intensive
  - Adult (>14 g)
    - (4.2 months)
  - Brackishwater e marine (5-50 ppt)
- Stocking 6-10 PL/m²
  - Modified extensive
  - Adult (12-14 g)
    - (3-4 months)
  - Harvest
- Wild seed
- Natural stocking
- Traditional pond
  - Adult (8-20 g)
    - (3-6 months)
Valuable Natural Resources: Role Differences

Dune’s Spice (smoked as Melange)

• Key input in the lives of select humans to gain superpowers; health input consumed as primary product. Addictive.
• Imperialist mMarket trade not clear: “valuable in universe”; Fremen use/smuggle
• Is it used as money? “coinage”
• Buyers/users highly “inelastic demand”. A luxury commodity associated with despotic power and imperialism.

Shrimp Larva (raw material seed)

• Shrimp larva an input to final shrimp consumed in domestic market or shrimp exported (industrial farms).
• In 1980s-1990s (and SE Asia now), larva gatherers provided wild seed of different species (i.e. *penaeus vannamei*) which was “strong” and adapted to local climates of the grow-out farms.
• Farm managers as buyers had a slightly inelastic demand in a time window to match the planned dates of grow-out shrimp exports.
Natural Resource Extraction Methods: Similarities & Differences

- **Dune’s Spice**
  - Uncomfortable and dangerous: Collectors take this raw material (excretions) from under sands with vacuum; explosive blow; wear suits; compete with giant sandworms for control of this resource.
  - Need for special extraction equipment, escape machines.
  - Fairly inelastic supply. Monopoly power and resource rents.
  - Spice as renewable resource? (get mixture when water combined with excretions of “Little Makers” (sand vectors); blows to surface, gives *melange*.)

- **Shrimp Farming’s Larva**
  - Uncomfortable and dangerous: mangroves as wild zone; hot and humid; some animal predators (tigers vs. humans) in Asia; more human predators (security guards) in LAC.
  - Extraction equipment low-cost and accessible (hoop nets); but boat owners provide transport and get higher shares. Collecting at night/ morning in estuaries using boats, nets, air tanks; delivery to ponds.
  - Elastic supply of shrimp seed
  - Shrimp seed as renewable resource, as long as nearby ocean/gulf has shrimp and rate of fishing < rate of regeneration
Natural Resource Extraction Benefits Distribution: Some Similarities

• **Dune’s Spice: Location Key**

  Only on planet *Arrakis* (desert ecosystem). Source monopoly power: whoever controls area of extraction controls spice. Little mention of previous tenure; appears like private property now.

  • Capital-intensive: few jobs.

  • Alternative artisanal collection by hand done by eco-warriors Fremen.

  • Wages for extractors? Appear to be paid, not slaves.

  • Extreme inequality among extractors and leaders who use/sell spice.

• **Shrimp Farming’s Larva: Location**

  Mangrove areas as open access public lands; some previous “common property” management over gathering honey, etc. Attempts to privatize area for shrimp farms.

  • Labor-intensive: many jobs.

  • Wages have high variation, yet above minimum wage and poverty level. On good days earn $> minimum wage for those paid piece rate. Other group paid fixed + bonus; doing well.

  • Extreme inequality among extractors and shrimp farm owners. (Village boat owners in middle.)
Natural Resource Extraction Sustainability Differences

- **Dune’s Spice**
  - Nature regulates its extraction?
  - Worms appear to stop humans from taking too much spice; the rate of extraction in relation to renewal is not fully discussed.
  - Humans trying to conquer nature on water-scarce planet of Dune; books give impression these actors have hurt other ecosystems. Habitat in which the worms live and the spice is produced: Is the rate of the worms’ excrement ↑↓.

- **Shrimp Farming’s Larva**
  - Traditional harvesting seed gathering: unclear if was sustainable or not. Varies by region and degree of by-catch.
  - Artisanal farms sustainable. Industrial farming: overexpansion (due to overuse of incentives) means mangrove deforestation in some countries. Move to industrial shrimp farming introduces foreign pathogens (i.e. white spot disease) in an area and damages water quality. Leads to job loss.
  - Natural disasters (i.e. hurricanes) also ruin some mangrove forests (Honduras) in which seed grows.
Natural Resource Extraction Sustainability: Similarities

- **Dune’s Spice**
- Book series also mentions that later a *synthetic substitute* found by Tleilaxu; make spice in axlotl tanks.
- Breaks Rakian monopoly on spice.
- But still natural *melange* traded: “better”.

- **Shrimp Farming’s Larva**
- Eventually due to supply uncertainties, most vertically-integrated shrimp farms (i.e. Darden and Red Lobster) switch to Miami hatchery supplied seed: *synthetic substitute*.
- Farm marine biologists recall: wild seed better.
Lessons from Spice & Farm-raised shrimp

1) Extraction technology, control of land and water area key to resource rents and benefits from extraction.
2) Natural resource extraction can provide jobs to poor.
3) Extractive activities can be ecologically unsustainable if no checks.
4) Natural resource gathering is subject to disappearing if a synthetic substitute is found.