

Example 7.2. Breakdown of costs for a project involving larval rearing and *in situ* cage-culture of coral spat settled on tiles.

1. Collection of source material (mature colonies/colony-segments about to spawn).

1a. Equipment/consumables needed to collect source material – 37 colonies for spawning			
Item	Unit cost	Quantity	Total cost
Chisel	\$3	2	\$6
Hammer	\$4	2	\$8
Plastic containers	\$25	5	\$125
Total			US\$139

1b. Labour/diving/boat time needed to collect source material – 37 colonies for spawning		
<i>Surveys to predict dates of spawning</i>		
Item	Breakdown	Total
Person-hours (#)	2 people x 10 h (1 h per day for 10 days)	20
Air-tanks (#)	2 tanks per day for 10 days	20
Boat time (days)	10 half-day trips	5
<i>Collection of 37 colonies ready to spawn</i>		
Item	Breakdown	Total
Person-hours (#)	2 people x 2 h	4
Air-tanks (#)	2 tanks per person	4
Boat time (days)	half-day trip	0.5

2. Setting up *in-situ* cage-culture facilities

2a. Equipment/consumables needed to construct 10 nursery rearing cages to produce 2000-2500 juvenile corals per year on 320 tiles			
Item	Unit cost	Quantity	Total cost
Raft, buoys, rope, etc. – 3 year life			\$1686
Cages – 5 year life	\$275	10	\$2750
Tiles - annual		320	\$734
Cable-ties, etc. - annual			\$160
Hand nets – 3 year life	\$40	3	\$120
Juvenile top-shells (<i>Trochus</i>)		1500	\$110
Total			US\$5560

- Annual input of 320 tiles, cable ties, repair of 5 cages, etc. estimated at ~\$1120

2b. Labour/diving/boat time needed for setting up 10 nursery rearing cages to produce 2000-2500 juvenile corals per year on 320 tiles		
Item	Breakdown	Total
Person-hours (#)	Preparation of tiles in the sea and recovery: 2 people x 4 h	8
	Preparation of 320 tiles and 10 cages (on land): 2 people x 8 h	16
	Setting up raft	12
	Setting up 10 cages below floating raft: 3 people x 6 h	18
	Total	54
Air-tanks (#)	Tile preparation: None – tiles can be deployed to shallow water for “conditioning” and recovered using snorkel	
	Setting up cages: 18 hours SCUBA (3 h/day per person (3) for 2 days)	18
	Total	18
Boat time (days)	Tile preparation: 2 half-day trips	1

	Setting up cages: 2 full-day boat-trips	2
	Total	3

3. Establishing collected material in culture (ex situ).

3a. Equipment/consumables needed to establish collected material in culture/nurseries			
Item	Unit cost	Quantity	Total cost
Buckets, containers, filtering apparatus, portable underwater lights, hoses, cartridge filter, pipettes etc.			\$2300
Tile holders – 5 year life	\$5	20	\$100
Binocular microscope	\$900	1	\$900
Total			US\$3300

3b. Labour/diving/boat time needed to establish collected material in culture		
Item	Breakdown	Total
Person-hours (#)	Collection of eggs and fertilization (laboratory): 3 people x 5 h	15
	Rearing embryos and planula larvae (laboratory): 3 people x 25 h	75
	Settling larvae on tiles and rearing (laboratory): 2 people x 22 h	44
	Total	134
Air-tanks (#)	None	0
Boat time (days)	None	0

4. Maintenance of material in *in-situ* cage-culture with *Trochus*.

4a. Equipment/consumables needed to maintain and monitor 10 nursery rearing cages to produce 2000-2500 juvenile corals on 320 tiles			
Item	Unit cost	Quantity	Total cost
Vernier callipers, measure, cable ties, wire, etc.			\$140
Total			US\$140

4b. Labour/diving/boat time needed to maintain and monitor 10 nursery rearing cages to produce 2000-2500 juvenile corals per year on 320 tiles		
Item	Breakdown	Total
Person-hours (#)	Cleaning and monitoring every two weeks for one year: 2 people x 81 h (= 3 h per trip)	162
Air-tanks (#)	162 h SCUBA: 3 tanks per trip x 27 trips x 1 h per tank per person	162
Boat time (days)	1 half-day trip per two weeks x 27 trips	13.5

- If no maintenance is carried out then there is likely to be high mortality of corals due to fouling of cages. Regular cleaning of cages and inspection of tiles is essential to achieve any success.
- 90% of time used in maintenance (cleaning) and 10% for monitoring.

5. Transfer of 1-year old corals from *in situ* cage-culture to the restoration site and attachment with epoxy.

5a. Equipment/consumables needed to transfer juvenile corals reared on 320 tiles			
Item	Unit cost	Quantity	Total cost
Wire brushes, epoxy cement, etc. for transplantation			\$420
Total			US\$420

5b. Labour/diving/boat time needed to transfer juvenile corals reared on 320 tiles		
Item	Breakdown	Total
Person-hours (#)	Preparation for transportation to transplant site (land): 2 people x 5 h	10

	Transfer of juvenile colonies to site and attachment: 5 people x 4 h	20
	Checking and reinforcement: 2 people x 2 h	4
	Total	34
Air-tanks (#)	Transfer/attachment of juveniles to transplant site (4 x 5 h SCUBA): 20 tanks	20
	Checking and reinforcement (2 x 2 h SCUBA): 4 tanks	4
	Total	24
Boat time (days)	Boat trips for transfer of juveniles on 320 tiles: 1 full-day	1
	Checking and reinforcement: half-day boat trip	0.5
	Total	1.5

6. Maintenance and monitoring of transplants at restoration site.

6a. Equipment/consumables needed to maintain/monitor transplanted juvenile corals reared on 320 tiles			
Item	Unit cost	Quantity	Total cost
Underwater camera with housing	\$700	1	\$700
Wire brushes for cleaning	\$2	2	\$4
Ruler	\$2	1	\$2
Total			US\$706

- Camera omitted from costings spreadsheet as not essential (but can reduce time spent monitoring).

6b. Labour/diving/boat time needed to maintain/monitor transplanted juvenile corals reared on 320 tiles		
Item	Breakdown	Total
Person-hours (#)	Maintenance/monitoring 4 times/year: 2 people x 2 h per visit	16
Air-tanks (#)	Maintenance/monitoring 4 times/year: 2 tanks per person per visit	16
Boat time (days)	Maintenance/monitoring visits: 4 half-day trips	2

- Maintenance/monitoring visits should be carried out at least 2, 4, 6 and 12 months after transplantation. If grazing by fishes on newly transplanted corals becomes serious problem (this often happens within 2–5 days after transplantation), then temporary caging may be needed to avoid the damage.
- If every tile were to be protected by cages to avoid fish grazing, 320 cages (~US\$1600) would have to be prepared on land and cost for setting the cages in the sea using SCUBA would need to be estimated.