Example 7.3. Breakdown of costs for a project involving larval rearing and *in-situ* culture of coral spat settled on "coral plug-ins".

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

1a. Equipment/consumables needed to collect source material – up to 24 colonies for spawning			
Item	**Unit cost**	**Quantity**	**Total cost**
Chisel	$3	2	$6
Hammer	$4	2	$8
Plastic containers	$40	6	$240
Total			**US$254**

1b. Labour/diving/boat time needed to collect source material – up to 24 colonies for spawning		
Surveys to predict dates of spawning		
Item	**Breakdown**	**Total**
Person-hours (#)	2 people x 16 h (2 days, 2 people)	32
Air-tanks (#)	2 tanks per person x 2 days	8
Boat time (days)	2 day trips	2
Collection of up to 24 colonies ready to spawn		
Item	**Breakdown**	**Total**
Person-hours (#)	2 people x 8 h (1 day, 2 people)	16
Air-tanks (#)	2 tanks per person	4
Boat time (days)	1 day trip	1

- Costs will depend on location (i.e. distance of donor sites) and local costs of materials and purchasing or renting a boat and scuba equipment.
- If you were sure of spawning times, you might be able to reduce reconnaissance visits and go out at predicted time and check colonies in the field when collecting but this will not make much difference to overall costings.

2. Setting up culture facilities (*ex situ* rearing facilities for larvae)

2a. Equipment/consumables needed to construct one *in situ* nursery containing 1000 coral plug-ins			
Item	**Unit cost**	**Quantity**	**Total cost**
Nursery construction: Angle bars, mono filament line, PVC mesh	$35	1	$35
Coral plug-in (wall-plug with cement head – see Ch. 5) construction	$3 per 100	1000	$30
Total			**US$65**

- Life-times: Nursery – 2 to 3 years
- "Coral plug-ins" can be recycled (used at least once more) if no corals survive on them.

2b. Labour/diving/boat time needed for setting up one *in situ* nursery and 1000 coral plug-ins		
Item	**Breakdown**	**Total**
Person-hours (#)	Preparation of 1000 coral plug-ins: 3 people, 3 days	72
	Setting up of one *in situ* nursery: 2 people, half a day	8
	Total	**80**
Air-tanks (#)	Setting up nursery: 2 people x 1 tank each	2
	Total	**2**
Boat time (days)	Setting up nursery: 1 half-day boat-trip	0.5
	Total	**0.5**

- Costs will depend on location, available facilities and length of time that set-up will be used. Setting up a working flow through sea water system to be used for several years is a major investment. However, setting up simple tanks for holding corals and rearing larvae for a single spawning event can be relatively simple and inexpensive.

3. Establishing collected material in culture/nurseries.

3a. Equipment/consumables needed to carry out spawning and larval rearing for 1 million larvae at a land based hatchery			
Item	**Unit cost**	**Quantity**	**Total cost**
Holding tanks for colonies (500 litre tank holding 5-10 colonies)	$280	2	$560
Fertilization tank (100 litre)	$100	1	$100
Rearing tanks (1000 litre)	$280	4	$1120
Portable underwater lights	$30	4	$120
Hoses for water changes (approx. 6 metre length)	$5	1	$5
Cups and scoops	$2	6	$12
Filter bags (1 µm)	$10	6	$60
Plastic disposable pipettes (box of 100)	$5	1	$5
Culture well plates (6 x 12-17 ml wells)	$20	4	$80
Binocular dissecting microscope	$900	1	$900
Total			**US$2962**

3b. Labour/diving/boat time needed to establish collected material in culture		
Item	**Breakdown**	**Total**
Person-hours (#)	Monitoring colonies for spawning activity (hatchery): 2 people for 4 nights (6 h per night)	48
	Collection of eggs and fertilization on spawning night (hatchery): 4 people x 6 h	24
	Rearing embryos and planula larvae, including water changes, competency checks and density counts each day until settlement (hatchery): 2 people@6 h per day for 5 days	60
	Settling larvae on coral plug-ins including daily checks and water changes (hatchery): 2 people @6 h per day for 4 days	48
	Transfer of 1000 coral plug-ins from hatchery to *in situ* nursery: 4 people@8 h per day for 1 day	32
	Total	**212**
Air-tanks (#)	Transferring 1000 coral plug-ins to *in situ* nursery: 1 day, 4 divers, 2 tanks each	8
	Total	**8**
Boat time (days)	Transferring 1000 coral plug-ins to *in situ* nursery: 1 day	1
	Total	**1**

- Costs will depend on location, nursery size, types of materials used and length of time that set-up will be used. Nurseries can be set-up relatively cheaply using locally available materials. Nursery design may vary from floating mid-water structures to fixed designs.

4. Maintenance of material in culture.

4a. Equipment/consumables needed to maintain an *in situ* nursery with 1000 plug-ins			
Item	**Unit cost**	**Quantity**	**Total cost**
Vernier callipers	$10	2	$20
Brushes	$2	2	$4
Total			**US$24**

4b. Labour/diving/boat time needed to maintain an *in situ* nursery with 1000 plug-ins		
Item	**Breakdown**	**Total**
Person-hours (#)	Cleaning every month for one year: 2 people, 12 occasions (12 trips @ 4 h per trip)	96
Air-tanks (#)	2 tanks per trip x 12 trips	24
Boat time (days)	1 half-day trip per month for 12 months	6

5. Transfer of material from culture/nursery/farm to the restoration site.

5a. Equipment/consumables needed to transfer 1000 plug-ins with juvenile corals			
Item	**Unit cost**	**Quantity**	**Total cost**
Brushes	$2	4	$8
Epoxy cement	$2	50	$200
Hand drill/auger	$15	4	$60
Total			**US$268**

5b. Labour/diving/boat time needed to transfer 1000 plug-ins with juvenile corals		
Item	**Breakdown**	**Total**
Person-hours (#)	Transfer and attachment of 1000 juvenile colonies to site: 4 people x 8 h x 10 days	320
	Total	**320**
Air-tanks (#)	Transfer of juveniles to transplant site: 4 people, 2 tanks each x 10 d	80
	Total	**80**
Boat time (days)	Boat trips for transfer of juveniles on 1000 plug-ins: 10 full-days	10
	Total	**10**

- If drilled holes are a snug fit for wall-plugs then less epoxy is likely to be needed.

6. Maintenance and monitoring of transplants at restoration site.

6a. Equipment/consumables needed to maintain/monitor 1000 transplanted plug-ins with juvenile corals			
Item	**Unit cost**	**Quantity**	**Total cost**
No additional equipment needed			$0
Total			**US$0**

6b. Labour/diving/boat time needed to maintain/monitor 1000 transplanted plug-ins with juvenile corals		
Item	**Breakdown**	**Total**
Person-hours (#)	Maintenance visits 12 times per year: 2 people half-day visit (4 h)	96
Air-tanks (#)	Maintenance check 12 times per year (4 tanks per survey – 2 per person)	48
Boat time (days)	Maintenance check visits: 12 half-day trips	6

- The amount of maintenance will be site dependent. It might be sensible to visit the site at least once per month to carry out routine cleaning and removal of predators during the first 12 months. In some locations it has been shown that caging juvenile corals is beneficial as they can be removed by fish grazing. In Bolinao fish grazing has not been a problem (heavy fishing pressure and few grazers) but at some sites we experienced high mortality of transplants probably due to *Drupella* predation.
- It is recommended that survival monitoring is carried out monthly for first three months and then at least every two months during maintenance visits.