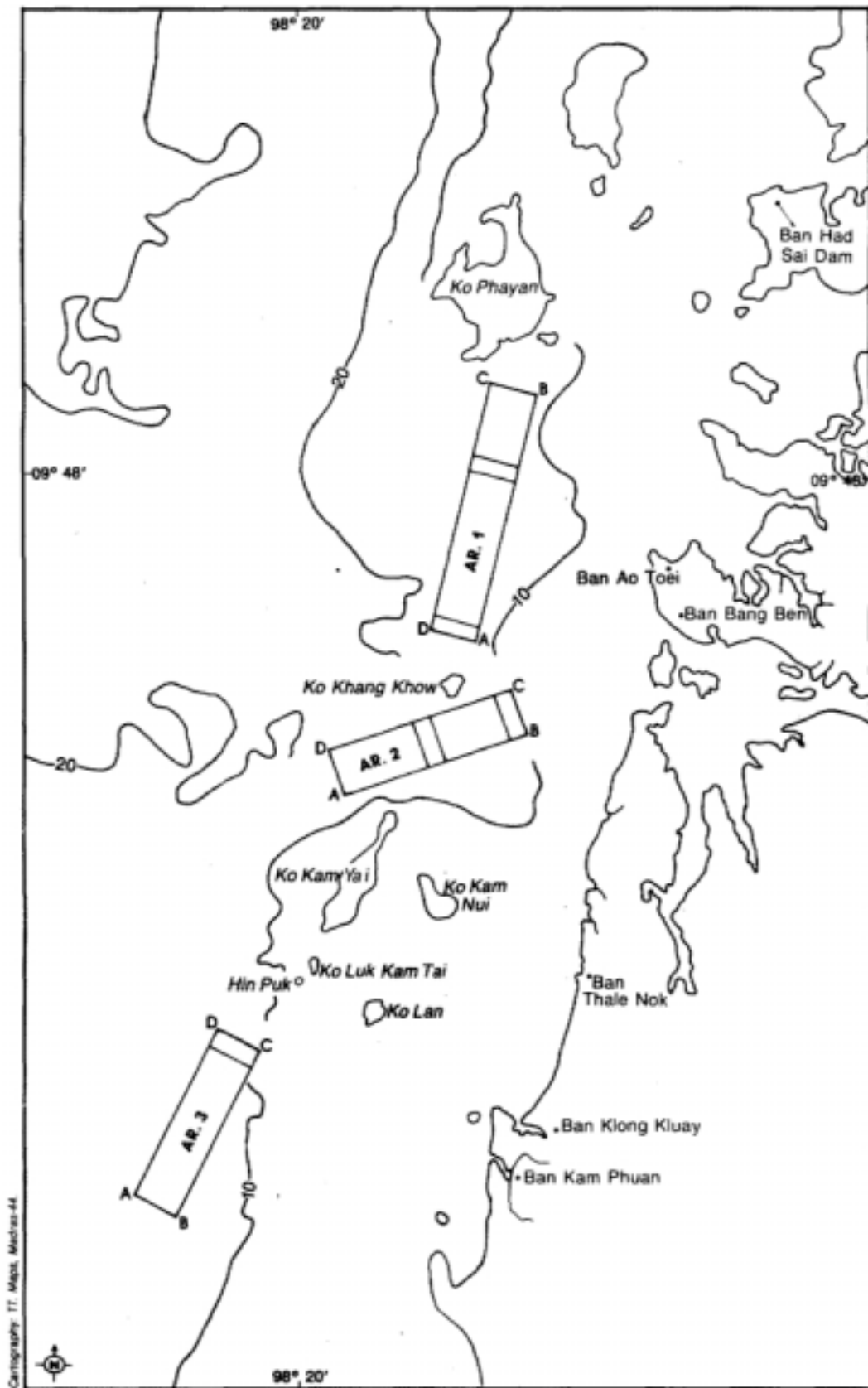


**Installation of artificial reefs in
Ranong Province, Thailand**

Fig 1. Location of artificial reefs (ARs) in Ranong Province, Thailand



The artificial reefs – reinforced concrete cubical modules – were installed at three locations (identified as AR1, AR2, and AR3) in a 51 sq.km area, 9-11 km off the Ranong Province coast at 12-17 metre depths (Figure 1).

The concrete modules were laid out in such a fashion as to create a rectangular patch at each of the sites. Within this patch, more modules were laid close to each other. This was done with the idea of deterring trawling in these areas.

The physical characteristics of the three ARs and their cost are given in Table 1.

Table 1: Main physical and financial characteristics of AR area in Ranong Province, Thailand - 1989

AR area	Modules in reinforced concrete			Volume (m ³)		Investment (Bah*)			Total AR Area sq. k.n.
	Size (m)	Volume (m ³)	Number	Per size of module	Total	Per module	Per size of module	Total	
1	1x1x1	0.145	3240	469.80	1869.80	495	1,602,763	6,378,947	22.05
	2x2x2	1.250	1120	1400.00		4264	4,776,184		
2	1x1x1	0.145	2440	353.80	1753.80	495	1,207,019	5,983,203	14.40
	2x2x2	1.250	1120	1400.00		4264	4,776,184		
3	1x1x1	0.145	1920	278.40	978.40	495	949,786	3,337,878	14.40
	2x2x2	1.250	560	700.00		4264	2,388,092		
Grand Total		7600	1102.00	4602.00	4602.00		3,759,568	15,700,028	50.85
			2800	3500.00			<u>11,940,460</u>		

AR1 is in a 22.65 sq.km area, between Ko Phayan and Ko Khang Khaw in Muang District. The four corners of the rectangular patch (12,250 x 1200 m) have the following coordinates (latitude, longitude):

- A - 9°34' 48"N; 98°23' 36"E
- B - 9°41' 18"N; 98°25' 12"E
- C - 9°41' 30"N; 98°24' 12"E
- D - 9°35' 00"N; 98°22' 36"E

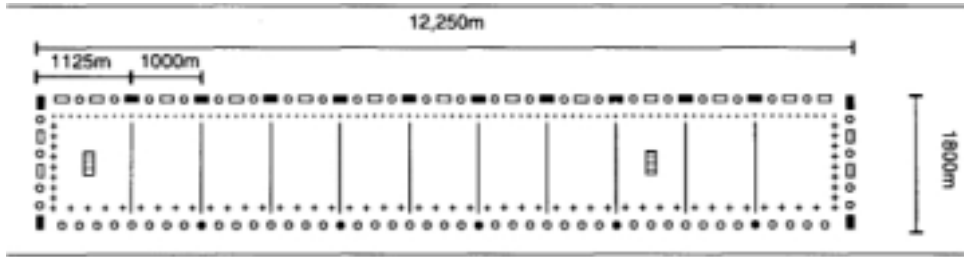
Figure 2 (overleaf) shows details of the layout of the modules for AR1, outlining the patch and the two inner spots with a heavier concentration of modules of 1 x 1 x 1m and 2 x 2 x 2m.

AR2 covers an area of 14.40 sq.km. between Ko Khang Khaw and Ko Kam Yai in Kaper District. The layout is given in Figure 3 overleaf and the coordinates of the four corners are:

- A - 9°31' 00"N; 98°20' 54" E
- B - 9°33' 12"N; 98°24' 38" E
- C - 9°34' 03"N; 98°24' 03" E
- D - 9°31' 31"N; 98°20' 24" E

US \$ 1 = 25 Baht (appx.)

Fig 2. AR1 — Ko Phayan - Ko Khang Khow, Muang District, Ranong Province



AR layout and module assembly, module ixixim

- Group of 5 modules with buoy Total group: 14; total modules: 70
- Group of 5 modules Total group: 18; total modules: 90
- Group of 3 modules Total group: 80; total modules: 240
- Group of 3 modules with buoy
- + Group of 2 modules Total group: 168; total modules: 336
- Row of 126-127 modules Total row: 11; total modules: 1,464

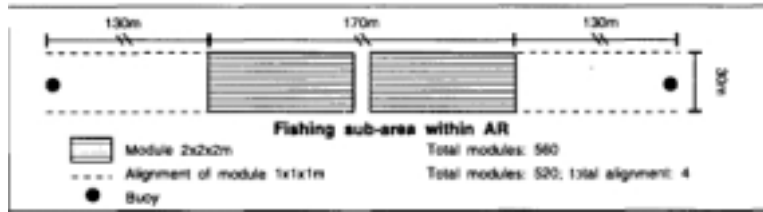
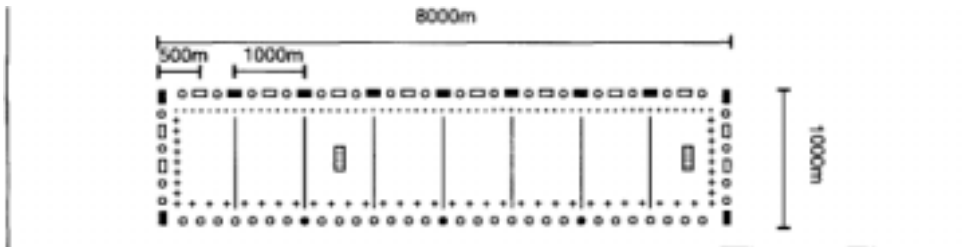


Fig 3. AR2 — Ko Khang Khow - Ko Kam Yai, Kaper District, Ranong Province



AR layout and module assembly, module ixixim

- Group of 5 modules with buoy Total group: 11; total modules: 55
- Group of 5 modules Total group: 12; total modules: 60
- Group of 3 modules Total group: 55; total modules: 165
- Group of 3 modules with buoy
- + Group of 2 modules Total group: 117; total modules: 234
- Row of 126-127 modules Total row: 7; total modules: 886

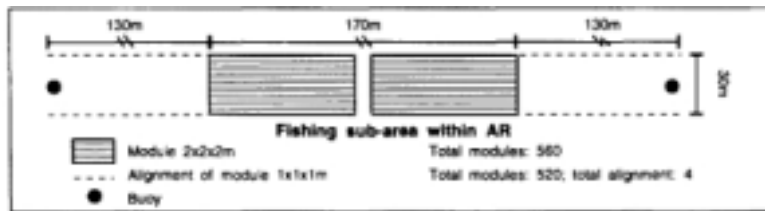
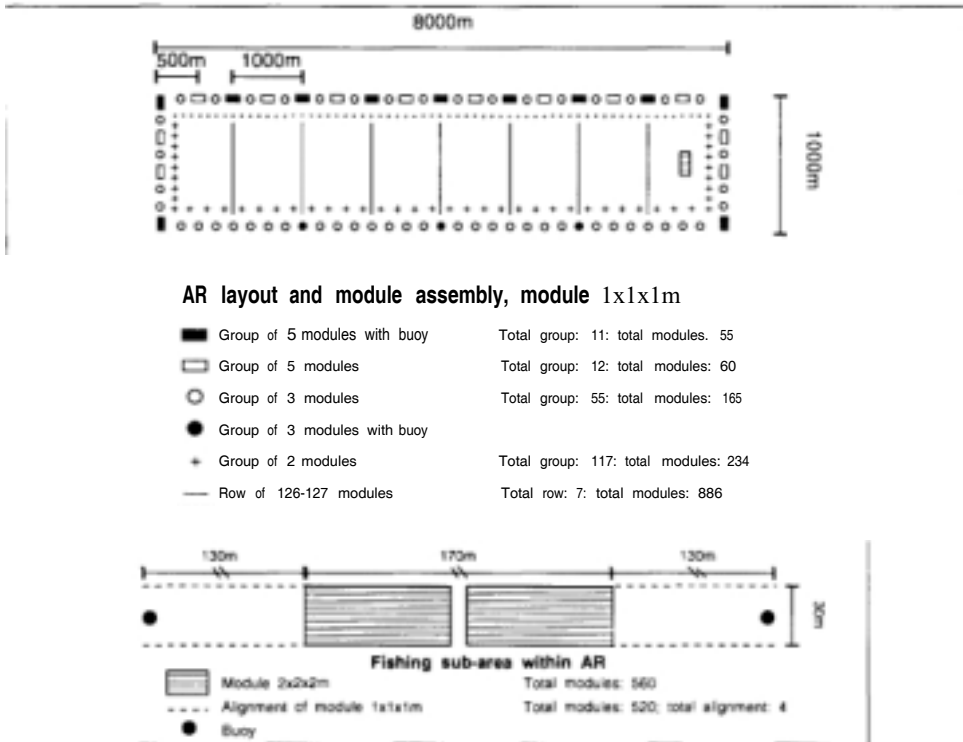


Fig 4. AR3 – Ko Lan - Ko Khai, Kaper District, Ranong Province



AR3 is similar to AR2 and lies between Ko Lan and Ko Khai, also in Kaper District (Figure 4).

Figure 5 is a diagram of a simple concrete module.

The total cost of installing the ARs was 15.7 million Baht, with ARI costing 6.4 million, AR2 6.0 million and AR3 3.3 million Baht respectively.

Fig 5. Diagram showing a concrete module

