

BIOFIN Thailand
Financial Needs Assessment Report on
Financing needs for biodiversity conservation in Thailand

1. Introduction

The purpose of this report is to present the preliminary estimates of financing needs for biodiversity conservation for Thailand. The results are based on three sources of information namely (i) National Biodiversity Strategic Action Plans (NBSAP) (ii) the budget estimate of MONRE and (iii) BIOFIN Thailand estimates of financing needs for coastal and marine ecosystems. It has been the intention of BIOFIN Thailand that more in-depth estimates for financing needs for terrestrial and inland wetland ecosystems similar to the details for coastal and marine ecosystems. This would, however, require additional time to collaborate with the line agencies responsible for these ecosystems, namely the Department of National Park Wildlife and Plants (DNP), the Royal Forestry Department (RFD) and the Office of Natural Environmental Policy and Planning (ONEP). It was thus decided that, parallel to the work undertaken on the pilot studies, we will be continuing with the work on costing selected measures for terrestrial and inland wetland ecosystems with the aim that by the end of 2018, we will have clearer ideas of measures required to improve the two ecosystem. Until these are available and accessible, the estimates in this report should be considered as the lower bound estimates of what will be required. Moreover the figures on overall financing needs have been revised and slightly differ from the sum reported in the BIOFIN Regional Workshop in Kazakhstan in April and this is due to different time period for cost estimates of coral reefs and seagrass restoration.

2. FNA According to the NBSAP

The current NBSAP consists of 4 strategies, namely (i) Strategy 1: Integrating the value and management of biodiversity resources involving stakeholders at all levels through participatory processes, (ii) Strategy 2: Conservation and restoration of biodiversity resources, (iii) Strategy 3: Protecting the national rights in terms of access and benefit sharing that is consistent with the concept of Green Economy and (iv) Strategy 4: Developing the knowledge and standardized database on biodiversity resources so that it is consistent with international standards.

Budget estimates has been estimated in two stages, i.e., for the period between 2015-2016 and 2017-2021. (Table 1). Among the four strategies, Strategy 2 has the largest share of the budget equivalent to 76% of the total proposed. What was observed from the information in this Table is that the cost estimates for the five years of the NBSAP was slightly less than the estimate for one single year, meaning in effect, that the estimated budget for the remaining years is only around 1/5 of the first year estimates. We have not been able to obtain explanation from the ONEP. Earlier on, we had understood that 2015-2016 figures were underestimates as line agencies reportedly did not report some of the measures as being biodiversity related. At a later stage, when 2016/21 estimates were made available, we were informed, albeit informally that the 2015-2016 figures were overestimates,

We have not been able to obtain any satisfactory explanation for the discrepancies. Back in 2016, even then it was understood to be an under-estimation.¹ This seemed however, to contradict the explanation offered by ONEP that the budget estimate for 2018-2021 appeared to be low because the 2015-16 figures were the implications being that the 2015-16 figures are overestimates. Whatever the underlying explanations may be, to push ahead with estimating financial needs for biodiversity conservation, we will assume that the Baseline scenario is the resources needed to finance biodiversity conservation is at least the sum of budget estimates for 2015/16 and 2017-21 which is 21,994 million Baht. The actual requirement would be much more. The budget estimate for the Department of National Park Wildlife and Plant for 2016 only is 10,928 million Baht². This suggests that the budget estimate

¹ Based on discussions in the BIOFIN Board Meetings and Working Group sessions.

² แผนยุทธศาสตร์กรมอุทยานสัตว์ป่าและพันธุ์พืช 2559-2654. Information was presented to the Steering Committee on November 11, 2016.

for one single year and for one single Department is almost the entire sum estimated in the NBSAP for all agencies involved for 5 years between 2017-2021. For one Department alone, it could be the case that the actual resource requirements would be 4 times higher than the NBSAP Baseline estimates. Thus while in an ideal situation, the NBSAP estimates could be readily used to reflect the financial needs to the country for management of biodiversity resources, based on this observation, we can only use the NBSAP estimates as one source of information to include for Thailand's financing needs assessment. As indicated by Table 1 below for the period between 2015-2021, according to the current NBSAP. Thailand would need 21,994 million Baht.

Table 1: NBSAP estimates for the period between 2016-2021

Strategy	2015-2016	2017-2021
Strategy 1: Integrating the value and management of biodiversity resources involving stakeholders at all levels through participatory processes. Under this Strategy, there are two action plans: (i) Action Plan 1.1 is increasing awareness and providing knowledge about biodiversity resources and (ii) Action Plan 1.2 to integrate and promote participation in the management of biodiversity resources.	890.23	745.24
Strategy 2: Conservation and restoration of biodiversity resources. This Strategy comprises 5 Action Plans which are (i) Conservation, restoration and protection of biodiversity resources, (ii) Reducing the pressure and ensuring sustainable use of biodiversity resources, (iii) Management of Wetlands, (iv) Management of alien invasive species and (v) Biosafety.	7538.46	8,353.28
Strategy 3: Protecting the national rights in terms of access and benefit sharing that is consistent with the concept of Green Economy. This strategy comprises two Action Plans. The first is to protect genetic resources, with an estimated budget of 51 million Baht. The second, with an estimated budget of 265.7 million Baht, covers Research and Development for the purpose of creating market values for biodiversity resources.	2078.14	131.08
Strategy 4: Developing the knowledge and standardized database on biodiversity resources so that it is consistent with international standards. This strategy comprises two Action Plans with a combined budget of 541.76 million Baht. The first under this strategy is Knowledge Management and Database. The second is to Protect Local/Traditional Knowledge about Biodiversity Resources.	541.76	1,715.83
Total	11048.59	10,945.43

3 Financing Needs According to MONRE

In addition to the NBSAP, one other source that can be used as reference to determining financial needs assessment is the Strategic Plan of the Ministry of Natural Resources and Environment (MONRE) which covers the same period as the NBSAP, i.e., 2016-2021. MONRE's Strategic Plan consist of strategies and a total estimated budget of 315,793.9 million Baht which is roughly 14 times higher than total NBSAP estimate for the same period. Of the five strategies, budget estimate is highest

for Strategy 1: Integrated Conservation and restoration of natural resources that fulfills the objective of development, sustainable utilization and fairness. This Strategy is incidentally the one which will have direct impact on biodiversity resources. Estimated budgetary requirement to implement this strategy is 113,722 million Baht is still around 5 times higher than NBSAP estimates. While the impact of other strategies maybe indirect, the benefits could be substantial by merely preventing or reducing the pressures.

Table 2: MONRE's estimates for the period between 2016-2021

	Million Baht	Million USD	Relevance to Biodiversity
Strategy 1: Integrated Conservation and restoration of natural resources that fulfills the objective of development, sustainable utilization and fairness	113,721.5	3,446.1	Direct
Strategy 2: Integrated and efficient management of surface and ground water	99,852.1	3,025.8	Indirect
Strategy 3: Participatory conservation and restoration of environmental quality	8,731.0	264.6	Indirect
Strategy 4: Prevention, mitigation and adaptation to extreme weather events and climate change	9,523.1	288.6	Indirect
Strategy 5: Institutional improvement for management of natural resources and the environment	83,966.1	2,544.4	Indirect
Total	315,793.9	9,569.5	

To assess the extent to which the estimate 315,793.9 million Baht estimated in the MONRE Strategic Plan differ from the Business as Usual scenario, we compared this with MONRE's actual and projected budget estimates in the MONRE Expenditure Report. In Table 3, figures for 2015-2017 are actual budget allocation. The figures for 2018-2021 are MONRE's estimates whereas the figures for 2020 and 2021 are estimates made based on assumption that budget will increase by 3% from the previous year. We then summed up the figures for the NBSAP period between 2016 - 2021. For MONRE, the total for the NBSAP period (2016-2021) would amount to 232,628.44 million Baht. Compared to the budget estimate in MONRE's Strategic Plan, which is 315,793.9 million Baht, this is a difference of 83,165 million Baht. For purpose of calculation, and based on the differences between MONRE's Strategic Plan budget estimates and MONRE's budget projections which will be called the Business As Usual scenario (BAU), at least for public sector investment, the budgetary allocation should at least be 30% higher than normal budgetary increase. Figure 1 is a graphical presentation of the difference between MONRE's Strategic Plan, MONRE's BAU budget estimates and NBSAP estimates.

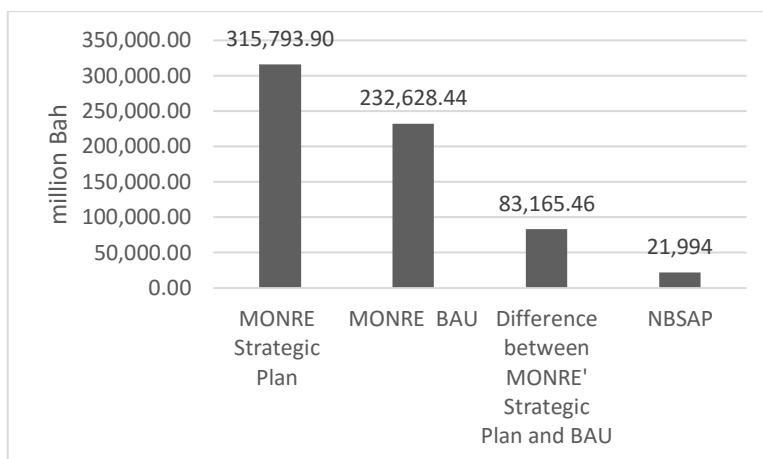


Figure 1: Differences in Financing Needs between MONRE between MONRE’s Strategic Plan, MONRE’s BAU budget estimates and NBSAP estimates.

4 Financing Needs for the Terrestrial Ecosystem.

To calculate financial needs to the terrestrial ecosystem, we scope our analysis to only three line agencies, namely Department of National Park Wildlife and Plants (DNP), the Royal Forestry Department (RFD) and the Pollution Control Department (PCD). By mandate, the three agencies perform different but complementary functions. The DNP’s role is primarily in forest protection, conservation and restoration. RFD’s task covers those roles in areas designated as national forest reserves but also covers ‘sustainable’ uses. The inclusion of the PCD is on grounds that although not directly related to the management of effective pollution control are crucial for reducing the pressure on the natural resources base and also to prevent, control and minimize pollution.

Referring to Table 2, the BAU budget increase for the DNP would be 96,982.75 million Baht. If a 30% higher budget estimate is assumed for the period 2016-2021, the additional budgetary requirement would be 32,445.28 million Baht. The financial needs for the terrestrial ecosystem could be considerably higher.³ The DNP, similar to all line agencies, is required by the government to formulate a 20-year plan, which should include budget estimates for the proposed activities. If and when this 20-year plan is released, it is most likely that, similar to the DMCR 20 year plan, there will be no cost estimates for plan implementation. For BIOFIN Thailand, even without accompanying cost estimates, the information will be useful because at least, it is an assurance that we are costing measures that are included in the road map defined by the implementing agencies themselves.

For the RFD and the PCD, the budgetary requirement above the BAU is 10,139.71 million Baht and 1,137.31 million Baht respectively. Adding the additional budgets for MONRE, DNP, RFD, DMCR and PCD, the total requirement would amount to 130,678 million Baht.

³ The 30% assumption is based on approximate difference between MONRE’s Strategic Plan and MONRE’s projected budget estimates.

Table 3: FNA of agencies related to the key ecosystems under Business as Usual Scenario (BAU) and assumptions of higher budget allocation.

	DNP	RFD	DMCR	PCD	MONRE
2015 ^{1/}	11,168.18	4,185.02	1,241.38	542.24	33,380.26
2016 ^{1/}	11,659.88	4,461.02	1,369.76	656.49	39,256.37
2017 ^{1/}	13,246.74	4,721.26	1,231.18	583.75	34,663.16
2018 ^{1/}	14,112.44	4,872.95	1,278.46	718.31	32,049.15
2019 ^{1/}	18,753.02	5,033.74	1,328.14	417.43	40,978.28
2020 ^{2/}	19,315.61	5,184.75	1,367.98	429.95	42,207.63
2021 ^{2/}	19,895.07	5,340.29	1,409.02	442.85	43,473.85
Total 2015-2021	108,150.93	33,799.04	9,225.92	3,791.03	266,008.70
Total NBSAP period 2016-2021	96,982.75	29,614.02	7,984.54	3,248.79	232,628.44
Assuming that additional requirement will be 30% over the BAU budget allocation over the period between 2015-21	32,445.28	10,139.71	3,791	1,137.31	83,165

1/ Based on information from MONRE Expenditure Report.

2/ Calculated based on assumption that under BAU, budget would increase by 3% per year

5. Financing Needs Assessment for the Coastal and Marine Ecosystems

The total cost of the measures related to coastal and marine as indicated by the NBSAP amounts to 5,628 Million Baht, consisting of 1,679 Million Baht for 2015-16 and 3,949 million Baht for 2017-21.⁴ For Coastal and Marine Ecosystems, there are ranges of activities that have been proposed which are not reflected in the NBSAP. Most important among these is the DMCR Action Plan which covers a 20-year period between 2018-2036. While this document contains detailed information on programs, projects, measures and activities, as yet none of the items have been costed. At this stage, the estimation of financing needs of the coastal and marine sector, we have scope our analysis to only the costing of restoring mangroves, coral reefs and seagrass ecosystem. The results shown in the following paragraphs are costing for a period of 10 years from 2018-2027. In the final section of this report, the total financial needs of the public sector are presented. The first is the lower estimate where we include costing for restoration of mangroves, coral reefs and seagrass ecosystems for the shorter period 2016-2021 which correspond with the current NBSAP period. The second is the higher estimate where we include costing for restoration of mangroves, coral reefs and seagrass ecosystems for a 10-year period 2016-2027.

5.1 Mangrove Restoration Costs

According the DMCR Action Plan, measures related to mangroves included targets for replanting, replenishing as well as reclaim some of the mangroves that have been encroached. (Table 4)

⁴ Orapan Nabangchang, Workbook 2: Cost of implementing national biodiversity strategies and actions Draft 2. September 2016

Table 4: Targets for mangrove restoration

	Unit cost 1/ Baht/rai 3/ Baht/rai 4/	Target for achievement (rai) 2/				
		2016-2017	2018-2021	2022-2026	2027-2031	2032-2036
Protection	1,160	1.5647	1.5954	1.6260	1.6567	1.6874
Reclaim	3,560	15,000	30,000	50,000	75,000	100,000
Replant	6,390	5,000	54,000	78,000	104,000	153,000

1. Data from the Budget Bureau
2. Based on DMCR Action Plan for 2016-2036
3. This is technically the cost of maintaining the conditions of the mangroves and is used here as the lower bound estimate of the cost of protect.
4. The cost is for replenishing the mangroves based on the assumption that whatever is reclaimed is in degraded conditions and need to be replenished

According the DMCR Action Plan, measures related to mangroves included targets for replanting, replenishing as well as reclaim some of the mangroves that have been encroached. Using the information on the target areas provided by the DMCR and unit cost estimates from the Budget bureau, the total budget required for the period between 2018-2027 would amount to 19,930 million Baht. (Table 5)

Table 5: Estimated costs for restoring the mangrove ecosystem.

	Unit: Million Baht			
	Cost to protect	Cost to replant	Cost to replenish	Total
2018	1,815	86	27	1,928
2019	1,815	86	27	1,928
2020	1,815	86	27	1,928
2021	1,815	86	27	1,928
2022	1,886	100	36	2,021
2023	1,886	100	36	2,021
2024	1,886	100	36	2,021
2025	1,886	100	36	2,021
2026	1,886	100	36	2,021
2027	1,924	133	53	2,110
Total	18,615	976	338	19,930

5.2 Coral reefs Restoration Cost

According to the experts in the DMCR, there are three possible options for replanting, namely transplanting on concrete, floating nursery and providing AR. Among the three techniques, the lowest unit cost is transplanting on concrete at 106,400 Baht/rai of coral reefs. Middle range cost would be Providing AR at 7,560,000 Baht/rai. The highest cost is floating nursery 18,720,800 Baht/rai. Although the choice of which option to take would depend on the physical setting of the reefs, for purpose of demonstration of the resources required to restore coral reefs, we have used the middle range unit cost of 7,560,000 Baht/rai as the basis for the calculations. If we assume that only the severely damaged reefs would be restored, the target areas would be around 37,538 rai. And we assume that for the high estimates only 10% of the severely damaged would be restored whereas in the low estimate only 5% would be restored. (Table 6)

Table 6: Summary of unit costs and budget requirement for restoration of coral reefs.

Low investment Scenario	
Total degraded coral reef areas to be restored	1,212
Area to be restored each year (rai)	121
Unit Cost (Baht/rai)	7.560
Budget required (mil. Baht/year)	916.27
Annual recurrent cost (1.5% of restoration cost)	1.5
High Investment Scenario	
Total degraded coral reef areas to be restored	2,424
Area to be restored each year (rai)	242
Unit Cost (Baht/rai)	7.56
Budget required (mil. Baht/year)	1,832.54
Annual recurrent cost (1.5% of restoration cost)	1.5
Project timeframe (years)	10

Using the information from Table 7, the financial requirement for the period between 2018-2027 for the low and high investment scenario would be 9,781 million Baht and 19,562 million Baht respectively.

Table 7: Estimated costs for restoring degraded coral reefs.

	Low investment Scenario (mil. Baht)				High investment Scenario Scenario (mil. Baht)			
	Cumulative area restored	Budget	Maintenance	Total	Area restored	Budget	Maintenance	Total (mil. Baht)
2018	121	916		916	242	1,833		1,833
2019	242	916	14	930	485	1,833	27	1,860
2020	364	916	27	944	727	1,833	55	1,888
2021	485	916	41	958	970	1,833	82	1,915
2022	606	916	55	971	1,212	1,833	110	1,942
2023	727	916	69	985	1,454	1,833	137	1,970
2024	848	916	82	999	1,697	1,833	165	1,997
2025	970	916	96	1,012	1,939	1,833	192	2,025
2026	1,091	916	110	1,026	2,182	1,833	220	2,052
2027	1,212	916	124	1,040	2,424	1,833	247	2,080
Total		9,163	618	9,781	Total	18,325	1,237	19,562

5.3 Seagrass Restoration Costs

Using the information about sea grass condition at the province, we made two cost scenario estimations. For high estimation, we assume that 2% of the sea grass area classified as being in poor condition would be restored which would be an area of 2,007 rai. This area was then used to multiply

the unit costs of replanting sea grass, which is 10.6 million Baht/rai⁵. For the low estimate, it is assumed that only 1% of the ‘poor’ condition areas are replanted which would be an area of 1,003 rai. (Table 8)

Table 8: Summary of unit costs and budget requirement for restoration of seagrass

Low Investment Scenario	
Target area is only the sea grass in poor condition (rai)	10,034
Area to be restored each year (rai)	100
Unit Cost for replanting (Baht/rai)	10.60
Annual budgetary requirement (mil. Baht/rai)	1,063.6
Maintenance cost	1.5
High Investment Scenario	
Area to be restored each year (rai)	200
Annual budgetary requirement (mil. Baht/rai)	2,127.21

Using the information from Table 9, the financial requirement for the period between 2018-2027 for the low and high investment scenario would be 11,354 million Baht and 22,708 million Baht respectively.

Table 9: Estimated costs for restoring seagrass in poor condition

Year	Low Investment Scenario (mil. Baht)				High Investment Scenario (mil. Baht)			
	Area replanted	Replanting cost	Maintenance cost	Total	Area replanted	Replanting cost	Maintenance cost	Total
2018	100	1,064		1,064	201	2,127		2,127
2019	201	1,064	16	1,080	401	2,127	32	2,159
2020	301	1,064	32	1,096	602	2,127	64	2,191
2021	401	1,064	48	1,111	803	2,127	96	2,223
2022	502	1,064	64	1,127	1,003	2,127	128	2,255
2023	602	1,064	80	1,143	1,204	2,127	160	2,287
2024	702	1,064	96	1,159	1,405	2,127	191	2,319
2025	803	1,064	112	1,175	1,605	2,127	223	2,351
2026	903	1,064	128	1,191	1,806	2,127	255	2,382
2027	1,003	1,064	144	1,207	2,007	2,127	287	2,414
Total		10,636	718	11,354	Total	21,272	1,436	22,708

To summarize, for the Baseline NBSAP Scenario, financial resources requirement for the coastal and marine ecosystem would be 5,628 million Baht for 5 years until the end of this current NBSAP in 2021. Assuming equal amount being allocated, each year, if approved the annual budget for

⁵ Nabangchang, O.

the remaining would be 1,125.6 million Baht. The area coverage and the cost of planting mangrove are assumed to be the same for both Low and High investment scenarios. Similarly, the NBSAP estimate is also included in both alternative scenarios, the justification being that restoration of mangroves, coral reefs and sea grasses are investments needed in *addition* to what is indicated in the NBSAP. The difference between these two scenarios would be on account of the higher area of degraded coral reefs and sea grass to be restored.

If we include the costs for restoring coral reefs and seagrass over a period of 10 years (2018-2027), the total financial resources requirements for the Low Investment Scenario is 50,484 million Baht and for the High Investment Scenario, 71,619 million Baht. (Table 8)

Table 8: Summary of financial resources requirements with 10-year costs for mangroves, coral reefs and seagrass restoration

Unit: Million Baht

Scenario	Low Investment	High Investment
NBSAP	5,628	5,628
Additional 30% on top of BAU	3,791	3,791
Mangroves	19,930	19,930
Coral reefs	9,781	19,562
Seagrass	11,354	22,708
Total	50,484	71,619

If we only take into account the financial requirements for the period up until the end of this current NBSAP, i.e., up until 2021. The total financial resources requirements for the Low Investment Scenario is 21,439 million Baht and for the High Investment Scenario, 29,536 million Baht. (Table 9)

Table 9: Summary of financial resources requirements with costs for mangroves, coral reefs and seagrass restoration for 2018-2021 only

Unit: Million Baht

Scenario	NBSAP	Low Investment	High Investment
NBSAP	5,628	5,628	5,628
Mangroves		7,712	7,712
Coral reefs		3,748	7,496
Seagrass		4,351	8,700
Total	5,628	21,439	29,536

6 Overall Financing Needs Under Different Investment Scenarios

The total financing needs shown in Table 10 is based on compiling the information from the preceding Tables. There are 4 sets of estimates, which differ according the areas of coral reefs and seagrass to be replanted. To reiterate, under ‘high investment’ scenario, 242 rais of degraded coral reefs will be restored and 200 rais of seagrass beds in poor condition will be replanted. Under ‘low investment’ scenarios, 121 rais of degraded coral reefs will be restored and 200 rais of seagrass beds in poor condition will be replanted. The cost estimates also differ according to the timeframe we include the costs of replanting coral reefs and seagrass. The shorter timeframe is when we include these costs up unto the end of the current NBSAP in 2021. The longer time period is when we include the costs for

coral reefs and seagrass restoration for a period of ten years between 2018-2027. In Table 10, for the shorter time period, the high and low investment scenarios would be respectively 176,580 million Baht and 146,489 million Baht. For the longer time period, the high and low investment scenarios would be respectively 214,872 million Baht and 193,737 million Baht. In Figure 2, the financing needs as estimated by the NBSAP is included as part of the cost for all four scenarios. In Figure 3, NBSAP financing needs is shown as a separate column.

	DMCR estimates for coral reefs and seagrass only for 2018-2021		DMCR estimates for coral reefs and seagrass only for 2018-2027	
	high investment	low investment	high investment	low investment
NBSAP	21,994	21,994	21,994	21,994
DNP	32,445.28	32,445.28	32,445.28	32,445.28
RFD	10,139.71	10,139.71	10,139.71	10,139.71
DMCR	27,699	19,602	65,991	44,856
PCD	1,137.31	1,137.31	1,137.31	1,137.31
MONRE	83,165	83,165	83,165	83,165
	176,580	146,489.30	214,872.30	193,737.30

3/ Based on FNA estimates for coastal and marine sector in Report assuming 'High Investment Scenario' for NBSAP period

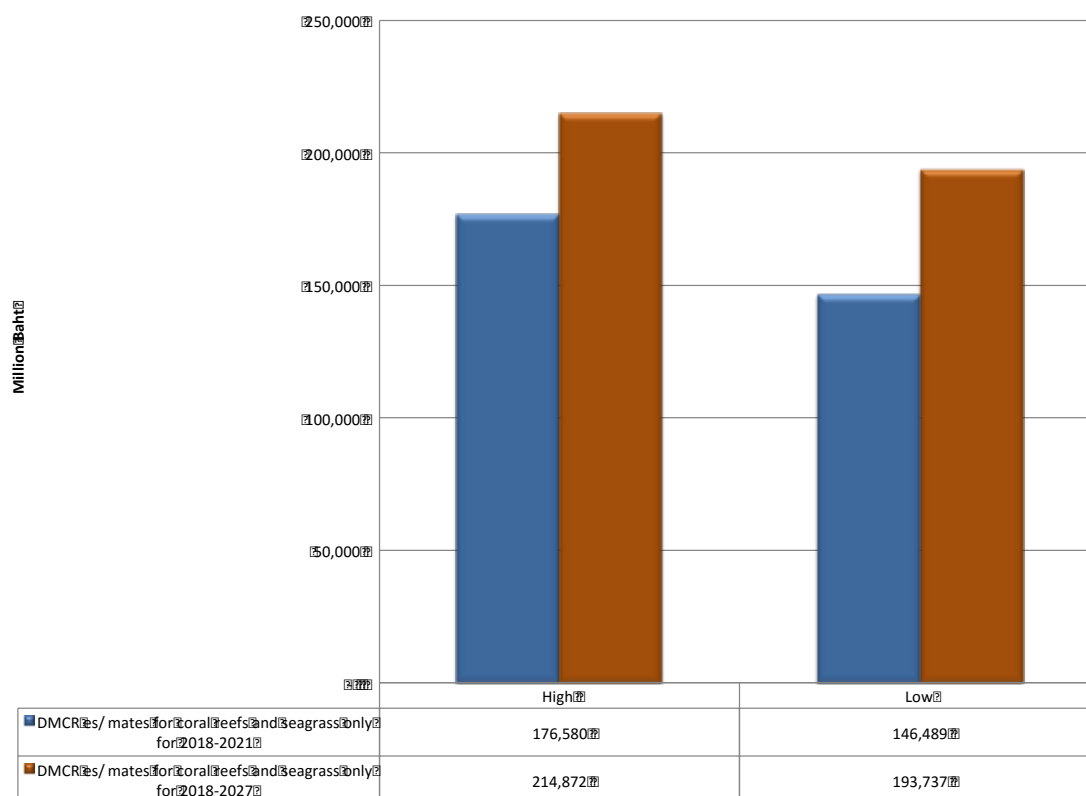


Figure 2: Financing needs assessment under four investment scenarios

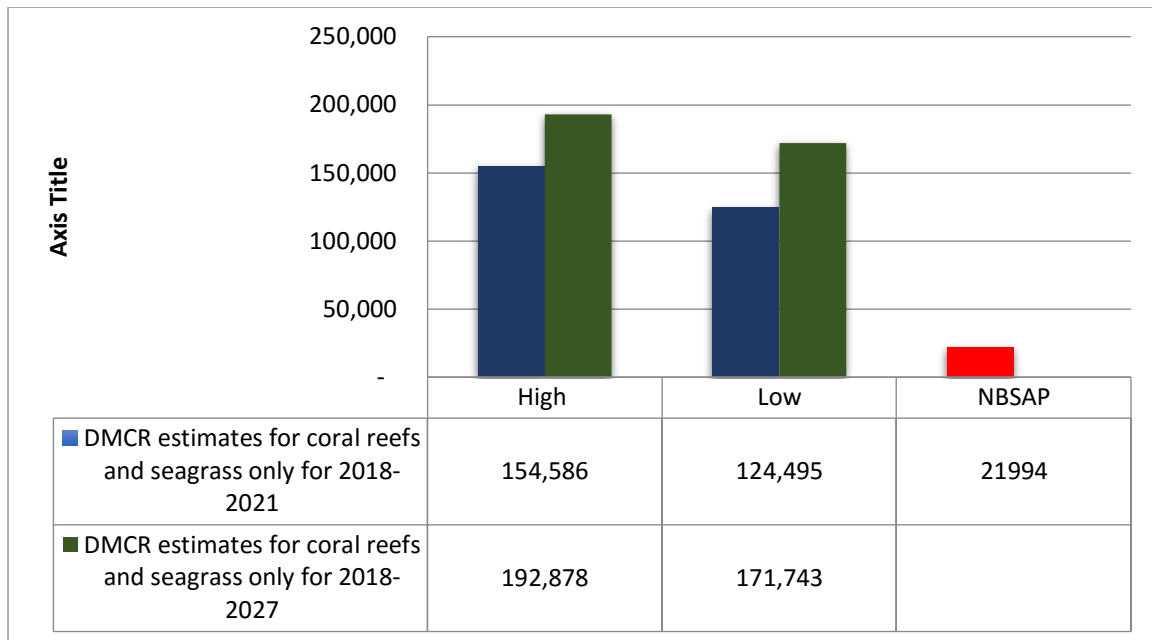


Figure 3: Financing needs assessment under four investment scenarios and NBSAP estimates.

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