

ACEH : SETTING THE PACE FOR AGRICULTURAL MODERNIZATION IN INDONESIA¹

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Introduction

Following the tsunami of 26 December 2004 in Aceh, there was an enormous international and national relief effort in Aceh for restoration of various economic and environment aspects both in the affected and unaffected areas. During the eleven month After tsunami, the government, international and national NGO began to look beyond the action for short term and long term need to restore and strengthen the livelihoods of people affected by tsunami.

In NAD's agriculture sector there was a big awareness of the tsunami impacted to agriculture production. During the post tsunami, there are two issues related to agriculture planning and development namely :

1. The way to rehabilitate agriculture land areas and the direction of agriculture development policy in tsunami affected area.
2. Whether farmers from the non affected areas face any problem in the distribution of agriculture products from the producer center to the market places including the price of the products at the producer level?.

Related to issue in point 1, We need to identify the potential area for agriculture production system, in the tsunami affected region. This issue also relate to the availability of factor production required for the cultivation areas and the direction of agriculture policy in 656 villages, a long the coastal areas affected by tsunami. (Figure 1).

The second issue related to *off farm* aspect both in the affected and non affected areas. To tackle this issue special effort needed to encourage the development of agro industries and the market of agriculture products as an incentive to agriculture production sector. Therefore, it is expected during the post tsunami the role of agro industry in NAD's agriculture become important and

¹ Paper Presented at the Agriculture Rehabilitation and Consolidation Workshop in Banda Aceh on 22 – 23 Nov. 2005. Sponsored by, FAO and BRR.

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contribute a considerable value added to the local economy. The expansion of agro industries in NAD's economy is expected to reduce unemployment in the region. Until June 2005 total labor force in NAD estimated at 1.780 million and unemployment reach 192.5 thousand people (ICASERD, 2005).



Figure. 1. Map of the Impacted Zone of Tsunami and earthquake in NAD

Related to post tsunami agriculture rehabilitation program, agriculture sector is expected to provide employment and able to generate income for rural

household. Therefore, several efforts have been done by government and NGOs following the agriculture rehabilitation program, starting from land rehabilitation until various planning activities including building a new rice field in the affected areas. In several tsunami affected areas some progress of land rehabilitation conducted by NGO were achieved, which ultimately lead to higher food crop production.

Information on NGO's involved in Agriculture sector in the post tsunami development program available in UN-IMS website (www.huminatarianinfo.org). Recently, there are several NGOs supporting agriculture development. There are two categories of NGO involved in agriculture rehabilitation, the first type including the NGOs directly active in physical land rehabilitation. And the second type covered the NGO which are indirectly involved in land rehabilitation but have been involved in various agriculture cultivated activities under their livelihood program. The first type of NGO currently conducting various survey in agriculture land preparation, while the second type encourage the farmers to cultivate their land with various agriculture commodities along with financial and technical assistance..

NAD's Agriculture Performance

1. The Role of Agriculture in NAD's Economy

Oil and gas production is no longer considered as the engine of economic growth in Aceh. The contribution of oil and gas in NAD's GDP in 1990 reached 77 percent, however by 2003, the contribution of this sector to GDP had declined to 19.7 percent (Aceh Dalam Angka, 1991 & 2003). Several industries with highly depended on natural gas in Aceh such as fertilizer industries, and paper industry have been closed down and other have reduced their production. The unemployment rate in NAD is quite high about 11.2 percent which is higher than the national unemployment rate of 9.5 percent in 2003.

Conversely, the contribution of agriculture sector, processing and services sectors seem steadily increased, with the agriculture's contribution to NAD GDP increasing from 11 percent in 1990 to 28 percent in 2003 (Table 1).

Table 1. Structure of NAD's GDP in 1987, 1990 and 2003 at 1987 constant price (%)

Economic Sectors	Year		
	1987	1990	2003
Agriculture	14.7	10.5	28.1
Oil and Gas	69.0	76.5	19.6
Processing Industries	3.7	2.6	19.7
Services and others	12.6	10.4	32.6
Total	(%)	100.0	100.0
	(Rp. Million)	4,593,350.0	7,467,038.0

Source: Aceh dalam Angka, BPS.

Based on the above information agriculture sector seem as one of future economic engine in NAD's economy. In 2003 Agriculture sector absorbed a biggest share of NAD's employment (48 percent). This implies that agriculture sector play a crucial role to NAD's development process. Recently, NAD's agricultural sector is expected to play an important role in food supply and creating job opportunities for the community. Therefore proper NAD's agriculture policies are important for poverty alleviation and enhance rapid economic growth.

Table 2. The Structure of NAD's Employment (2003)

Sector	Number of Employment	
	Persons	%
Agriculture	1,073,454	47.6
Processing industries	87,636	3.9
Constructions	93,705	4.2
Trade	468,057	20.8
Transportation and Communication	101,292	4.5
Finance, Insurance, and Services	12,756	0.6
Mining and quarrying	407,130	18.1
Total	2,254,255	100.0

Sources: sakernas, BPS, 2003.

Unfortunately, the development of agriculture processing industries remain stagnant and tend to reduce their capacity due to political unrest. Meanwhile NAD's primary agriculture product (such as paddy) is reported to be based on survey conducted by ICASERD in May 2005. The same is also true for also estate crop products including several horticulture products. During the Aceh's political

unrest, the agriculture processor industries always face to overhead cost to fulfill the request from the rival involved in the conflict.

The survey conducted in May 2005 by ICASERD team in the several small rice milling processing units along the Blang Bintang rice processing center each month, those industries reportedly prepared the overhead cost between Rp. 250 thousand to Rp. 300 thousand for each of the rival involved in the conflict. The same problem is observed for the transportation services in connection to distribution of the agriculture product, half of the transportation cost were predicted for illegal payment along the production centre to the markets. Until August 2005, there have been 17 illegal collected payment point along the Aceh-Sumut border to Cunda Lhok Seumawe and were also found several collected point along the road of Meulaboh to Medan. Those illegal costs in agriculture distribution causing a serious problem in the expansion of investment in agriculture processing industries and transportation services.

As an example, the the average retail price of Blang Bintang rice product & Arias Rice product (milling in Medan) sold in Lambaro market in May 2005 are Rp. 3,000 and Rp. 3,900 per kg, meanwhile in 24 October 2005 the prices were Rp. 3,750 and Rp. 4,500 per kg respectively. The farm gate rice prices were between Rp. 2,450 to Rp. 2,750 per kg (paddy conversion to rice). It is arguably, that the rice produce from rice milling in Blang Bintang face a higher cost compared to the same product produce in Medan. Meanwhile the raw material of paddy used in those rice milling center come from the same place, where the distance between Blang Bintang to Lambaro market less than 5 Km and Medan to Lambaro market about 700 km. These condition put the competitive advantage of the processing industries in Aceh in the lowest position.

The post tsunami period expected as the entry point for the the policy makers to develop Aceh agriculture industry, through the elimination of various illegal payment which distorted Aceh's agriculture production system. This situation also supported by the Helsinki peace agreement signed by the Government of Indonesia and the Aceh Free Movement.

2. Agricultural Market Situation in NAD

Except eggs, NAD reported as the producer of several agriculture products, among others are: rice, coconut, and several fruits. Tsunami disaster has

destroyed agriculture land areas and finally impacted to the availability of agriculture production. For NAD's population rice is always as the main agricultural commodity for rural household, because rice is a staple food for the NAD's community. Therefore the rice balance sheet become the important indicator to view the stabilization of NAD economy.

Assuming the average rice consumption in NAD is at 126.7 kg/capita/year and if 2005's rice productivity is 0.85 of that of 2004. Based on ICASERD survey, NAD is expected to be still a rice surplus in 2005 although it will be smaller than the surplus of 2004. This is because the demand will decline as a result of the drop in population even though about 36,347 hectare out of 282,373 hectare of rice field has been damage. This is suggested that if distribution infrastructure could function efficiently, NAD will have no constraint with rice availability.

Table 3, presented the rice balance sheet in NAD for several districts from 2002 until 2005.

Table 3. Rice Marketable Surplus in NAD 2002 – 2005 by District (in Tonnes of Rice).

District	2002	2003	2004	2005
1. Banda Aceh	(29,313)	(30,943)	(31,767)	(18,547)
2. Aceh Besar	63,458	59,608	58,550	17,110
3. Pidie	64,377	49,819	49,232	14,729
4. Bireuen	40,783	64,545	63,748	3,508
5. Aceh Utara	(13,914)	(30,567)	(33,254)	30,397
6. Aceh Jaya	-	21,960	21,700	(8,799)
7. Aceh Barat	13,469	(31,430)	(32,869)	27,151
8. Aceh Barat Daya	-	45,225	44,917	4,984
Total	303,307	446,587	484,206	234,650

Number in parentheses indicated the deficit.

Sources: ICASERD, 2005.

In general, from 2002 to 2005, NAD is a rice surplus region out, of eight districts visited during the study, only Banda Aceh and Aceh Jaya experienced a rice deficit. Banda Aceh is traditionally as a rice deficit region. Interestingly Aceh Barat and Aceh Utara that were a deficit region, prior to the tsunami are estimated to have a surplus in 2005. This is because the area of rice production in 2005 decline significantly, but the population declined more due to tsunami victim.

3. Agriculture Land Damage

Agriculture Wet Rice Land

Although the tsunami wave destroyed the coastal areas of NAD's but several researches were reported that tsunami also ravaged agriculture wet rice land and non agriculture wet rice land. Agriculture wet rice land and non agriculture wet rice land area affected by tsunami can be classified as: not affected, lightly (sedimentation < 10 cm, moderate (sedimentation between 10 – 20 cm), and severely (sedimentation > 20 cm).

Based on Mapframe data released by collaboration among Bapenas, BRR, BPS, ADB and HIS in 2005, agricultural wet rice land in Aceh reported 316,353 hectare, among others 48 percent is irrigated agricultural wet rice land and 52 percent is non irrigated wet rice land (rain fed). Number of irrigated wet rice land and non irrigated wet rice land destroyed by tsunami are presented in Table 4.

Table 4 Number of Wet Rice Land Destroyed by Tsunami

Tsunami Land Classifications	Irrigated land (ha)	Rain fed land (ha)
Not Affected	136,964	109,062
Lightly damage	2,616	7,655
Moderately damage	4,889	4,442
Severely damage	2,369	14,386
No information	4,916	29,054
Total	151,754	164,599

Source: Calculated from Mapframe 2,2 (2005)

Based on Table 4 above, the number of irrigated land and rain fed land not affected by tsunami are about 43.3 percent and 34.5 percent of total rice land. Meanwhile, the number irrigated wet rice land destroyed by tsunami reported as 0.8 percent classified as lightly destroyed, 1.5 percent moderately damage, 0.8 percent severely damaged. And the total number of irrigated agriculture wet rice land and non irrigated wet rice land suffered by tsunami disaster estimated about 43.3 percent and 34.5 percent, respectively.

Table 5 and Table 6, presented the distribution of irrigated wet rice land and non irrigated wet rice land affected by tsunami in each district in NAD. The number of irrigated wet rice land and rain fed land affected by tsunami in each district difference each other. The district with the coastal areas covered by the

low land topographic and closed to earthquake epicenter face a catastrophe land problem.

Table 5, presented the rice field land agricultural damage due to tsunami and earthquake. The irrigation rice field severely destroyed commonly found in Aceh jaya, Aceh Barat and Aceh Besar. On the other hand the moderately rice field areas classified as moderately damaged reported occurred in Aceh Selatan, Pidie, and Bireuen. The lightly destroyed irrigation wet rice lands are found in Aceh Singkil, Aceh Selatan, Bireuen, Aceh Utara, and Aceh Barat Daya.

Table 5. Number of Irrigated Wet Rice Land Affected by Tsunami in Each District in NAD, 2005

No	District	Irrigated Wet Rice Land (ha)				Total affected land
		Not Affected	lightly	Moderately	Severely	
01	SIMEULUE	0	0	0	210	210
02	ACEH SINGKIL	1,146	663	35	0	698
03	ACEH SELATAN	6,819	204	1,300	240	1744
04	ACEH TENGGARA	no information				
05	ACEH TIMUR	10,191	0	0	0	0
06	ACEH TENGAH	no information				
07	ACEH BARAT	5,009	0	0	448	448
08	ACEH BESAR	16,594	0	207	532	739
09	PIDIE	39,078	96	1,496	151	1743
10	BIREUEN	10,629	579	1,652	149	2380
11	ACEH UTARA	30,761	130	199	185	514
12	ACEH BARAT DAYA	8,790	904	0	0	904
13	GAYO LUES	no information				
14	ACEH TAMIANG	no information				
15	NAGAN RAYA	7,047	0	0	5	5
16	ACEH JAYA	509	0	0	439	439
17	BENER MERIAH (*)	no information				
71	BANDA ACEH	3	0	0	10	10
72	SABANG	0	0	0	0	0
73	LANGSA	388	0	0	0	0
74	LHOKSUMAWE	0	40	0	0	40

Source: Calculated from Mapframe 2,2 (2005)

Meanwhile, the non irrigated wet rice land with severely damaged were found in Aceh Barat, Aceh Besar dan Nagan Raya. The moderately and lightly non irrigated wet rice land reported occurred in Simeulue, Aceh Singkil, Aceh Utara, Pidie dan Bireuen.

Therefore the rice field agriculture land rehabilitation strategy should consider the degree of land damaged, because the cost of land rehabilitation quite different between the degree of the damages in the respected area. Based on the Mapframe data, the wet rice land areas destroyed by tsunami disaster to be rehabilitated covered 36,357 hectare.

Table 6. Non Irrigated Wet Rice Land Affected by Tsunami in Each District in NAD, 2005

No	District	Non Irrigated Wet Rice Land (ha)				
		Not Affected	lightly	Moderately	Severely	Total affected land
01	SIMEULUE	2,278	4,333	2,091	3,860	10,284
02	ACEH SINGKIL	2,512	2,077	313	503	2,893
03	ACEH SELATAN	5,743	270	157	510	937
04	ACEH TENGGARA	no information				
05	ACEH TIMUR	31,272	0	38	8	46
06	ACEH TENGAH	no information				
07	ACEH BARAT	15,850	0	0	4,045	4,045
08	ACEH BESAR	11,690	0	598	2,442	3,040
09	PIDIE	7,029	180	415	8	603
10	BIREUEN	4,979	51	255	3	309
11	ACEH UTARA	10,937	563	383	472	1,418
12	ACEH BARAT DAYA	1,742	90	0	0	90
13	GAYO LUES	no information				
14	ACEH TAMIANG	no information				
15	NAGAN RAYA	11,167	0	0	2,361	2,361
16	ACEH JAYA	200	0	6	81	87
17	BENER MERIAH (*)	no information				
71	BANDA ACEH	200	0	6	81	87
72	SABANG	0	0	0	0	0
73	LANGSA	2,375	0	0	0	0
74	LHOKSUMAWE	1,088	91	180	12	283

Source: Calculated from Mapframe 2,2 (2005)

Non Wet Rice Land (Tree crops Land)

Non wet rice land (tree crops land) covered two type of cultivated land namely: garden (*lahan pekarangan*) and estate cultivation land (*kebun*). The garden and estate cultivated land destroyed commonly occurred in the west coastal areas of NAD. The garden cultivated land commonly found in the settlement area, and the estate plantation areas found along the coastal line. In the several areas the peat swamp used as the estate plantation to cultivate coconut

The tree crops cultivated in the garden and estate in the eastern and western regions of NAD are for the livelihood purposes of the household farmers. In the garden the farmers commonly cultivate: banana, rambutan, nangka, kedondong, langsung, durian, coffee, coconut, pinang, mangoes, manggis, kacang panjang, peanut, terong, cucumber, and maize. Several of the cultivated products are for subsistence oriented, an a part was for sale. While the estate land cultivated with coconut palm, cocoa, and rubber are used for commercial purpose.

From 637,241 hectare of garden which was destroyed by tsunami include 4.6 percent classified as severely damaged, 4.1, and 10.5 percent categories as moderately and lightly damaged, and 80.8 percent not affected by tsunami. And from 459,305 hectare of estate plantation land 5,9 percent face severely damaged, 2.9 percent and 11 percent as moderately and lightly damaged

In several part of severely damaged estate land in the western region of NAD the land was change to swampy area, meanwhile in the eastern region remain the same as previously. The last survey conducted in October 2005 on several estate coconut plantation land along the coast line of Kabupaten Aceh Barat become a swamp area but the coconut palm still survive. In several part of Kabupaten Aceh Jaya the coconut estate plantation were wipe out. Therefore these change increase the swamp area in the western region of NAD.

The tree crops have suffered little damaged, the coconuts palm as well as other palm species (sago, pinang palm) are productive in as far as they were not uprooted and washed out. The tree corps such as cocoa, and rubber were defoliated and resprouting within 2.5 month after tsunami.

Table 7. Non Wet Rice Land affected by Tsunami in Each District in NAD

District	Type	Non Wet Rice Land (ha)			
		Not Affected	lightly	moderately	severely
Semeulu	Garden	645	7,938	4,852	5,364
	Estate	4,605	9,508	6,160	14,012
Singkil	Garden	8,777	8,259	184	158
	Estate	14,280	18,039	366	1,151
A. Selatan	Garden	55,144	480	492	910
	Estate	64,177	737	991	1,236
A. Tenggara	Garden	no information			
	Estate	no information			
A Timur	Garden	107,001	0	1,377	2,306
	Estate	59,150	0	22	161
A Tengah	Garden	no information			
	Estate	no information			
A Barat	Garden	17,390	0	0	2,793
	Estate	13,905	0	0	3,527
A. Besar	Garden	78,293	0	6,761	12,736
	Estate	18,463	0	952	6,824
Pidie	Garden	94,574	255	6,041	1,353
	Estate	26,624	25	1,332	165
Bireuen	Garden	37,921	875	3,783	410
	Estate	28,501	415	3,128	46
A Utara	Garden	56,973	2,132	1,652	3,370
	Estate	73,366	54	0	127
A Barat Daya	Garden	2,617	0	0	0
	Estate	9,809	920	0	0
Gayo Luwes	Garden	no information			
	Estate	no information			
Tamiang	Garden	0	0	0	0
	Estate	0	0	0	0
Nagan Raya	Garden	14,881	2,232	0	0
	Estate	37,988	6,364	0	0
A. Jaya	Garden	30,844	43,187	0	0
	Estate	13,282	10,462	0	0
Bener meriah	Garden	no information			
	Estate	no information			
Banda Aceh	Garden	151	321	835	0
	Estate	92	2	24	0
Sabang	Garden	1,083	765	0	0
	Estate	1,372	3,709	0	0
Langsa	Garden	3,709	0	0	0
	Estate	2,718	0	0	0
L. Seumawe	Garden	4,739	398	280	224
	Estate	205	175	118	16

Source: Calculated from Mapframe 2,2 (2005)

Recently, most of the tree crops in the affected areas growing in a good performance. The tree crops performance in tsunami disaster depending on tree crops species, flooded time period, rainfall intensity in the post tsunami, and drainage condition.

Propose Direction for NAD Agriculture Development

Based on the above elaboration, past tsunami agriculture rehabilitation program must be conducted covering two aspects, namely:

1. Physical agriculture land rehabilitation.
2. Strengthening agriculture infrastructure.

The rehabilitation program will be conducted within two period. The first period is from April 2005 to December 2005. And the second period is from 2006 to 2009. The degree of damaged in the affected village areas must be considered in Agriculture rehabilitation programs. The agriculture rehabilitation program will be carried out in 10 districts in NAD, namely : Aceh Besar, Aceh Jaya, Aceh Utara, Pidie, Bireuen, Nagan Raya, Simeulue, Aceh Barat, Aceh Barat Daya and Aceh Timur (see Appendix 1) and the activities has been structured in three integral component and seven sub components as follow:

1. Rehabilitation of farm capacity, recovery of rural household economy and promotion of sustainable livelihood.
 - ✿ *Emergency and short term Rehabilitation activities Agriculture land Rehabilitation.*
 - ✿ *Reconstruction of rural household economy and promotion of sustainable livelihood.*
2. Rehabilitation and strengthening of Agriculture support services.
 - ✿ *Rehabilitation and strengthening of agriculture support services.*
 - ✿ *Agriculture technology dissemination.*
 - ✿ *Micro finance development.*
 - ✿ *Input supply services*
3. Community empowerment, technical and institutional support:
 - ✿ *Community empowerment, planning and coordination.*
 - ✿ *Technical support.*
 - ✿ *Institutional strengthening and capacity development.*
 - ✿ *Economic, common resources and policy*

Lightly Damage

Agriculture land rehabilitation program for lightly damaged category have been started since April 2005 until December 2005. The lightly damage land should be rehabilitated quickly to help farmers start their agriculture production. The lightly damaged irrigated, non irrigated wet rice land and estate crops land can be rehabilitated by farmers individually or by farmers' groups with supported fund from the government. The lightly destroyed rice field areas covered 10,271 hectare, which consist 2,616 hectare irrigation rice wet land and 7,655 hectare rain fed land.

On the other hand from 459,350 hectare estate plantation areas, 80.2 percent not affected by tsunami, 11.0 percent and 2.9 percent fall in the lightly and moderately damaged, the severely damaged reported about 5.9 percent.

The cost to restoration the agriculture land in this category estimated Rp. 1.5 million – Rp. 2 million per hectare. This cost only for labor to remove mud and cleaning the land from the debris and exclude the cost for rehabilitation of village irrigation channel. In Aceh Barat (Suak Timah village) the village irrigation rehabilitation has been conducted through the livelihood program. The technical operational strategy concerning the development program in the village level conducted with local community participation namely 'cash for work', which recently face a serious criticized by local NGO.

In the lightly damaged agriculture land area, a start has been made to procure seeds, fertilizers, and others farm inputs to help farmers cultivated their land. The last survey in October 2005 on the performance of food crops cultivation such as paddy, maize, and peanut in several part of lightly agriculture damaged (Leupung, Teunom, Suak Timah and Kuala Tripa) the plant growing rapidly. Most of the cultivated food crops in that area planted for livelihood program under NGO project. The same performance also reported in the affected tsunami eastern region of NAD especially in Pante Raja (Pidie).

In Kuala Tripa (Aceh Barat Daya) for instance, about 5 hectare agriculture land areas were cultivated with horticulture, peanut and maize supported by livelihood project sponsored by CRS and others local NGOs. In several part of Lhoong (District of Aceh Besar) the rice fields were cultivated with paddy and growing rapidly (October 2005). Based on the interview with farmers in Teunom

(Aceh Jaya) and Samatiga (Aceh Barat), the food crops growing better in lightly damage agriculture land comparing previously.

In the tree crops plantation land coconut, cocoa, rubber, clove and coffee will be replanted on the estimated on 50,410 hectare. Seedlings, and other required input will be supplied to the small holder farmer.

In the lightly damaged areas the village road also need to rehabilitate quickly to ensure the connectivity of farms with the agriculture market centers.

Moderately and Severely Damage

This include along term tsunami rehabilitation program, which will plan during the period of 2006 to 2009. Moderately and severely agriculture land rehabilitation need a better physical planning. The planning covered the spatial planning: to build new rice field areas, mapping of physical and chemical content in agriculture land affected by tsunami, mapping on agriculture technology available and propose by topography and Agro Ecological Zone, Mapping on land used by the main crops cultivated, and mapping on the possibility of the distribution of factor productions and agriculture products by village and market, including others activities which support agriculture development program.

In the moderately destroyed affected areas, the rehabilitation program covered the activities of the restoration for primary and secondary irrigation channel including environment drainage. However in the severely agriculture affected areas, the agriculture program beside focuses on various rehabilitation activities but also planning to build a new rice field in a certain village or sub district with special emphasis on the watershed availability and management.

On the other hand, the wet rice field land categories as moderately and severely damaged areas, however, the rehabilitation will require the direct assistance from the government or NGOs, because it requires mechanized heavy equipment. The cost for cleaning the field of mud, estimated between Rp. 2.0 million – Rp. 3.0 million per hectare for moderately wet rice field destroyed, and about Rp. 3.5 million – Rp. 4 million per hectare for severely damage rice field.

The cost to build new wet rice field with irrigation canal in the severely damaged areas, however, is much more expensive ranging from Rp. 25 million to Rp. 50 million per hectare. The greater cost of rehabilitation will be in the more extensively damage areas.

In those agriculture producer centers, the village roads, and village & sub district markets need to restore quickly to ensure the agriculture product could be distribute to several destinations.

Non Affected Agriculture Damage Land

Agriculture activities in non affected tsunami disaster area always encourage pushing the production through:

1. introducing the new crops species and used the proper agriculture technology in agriculture activities.
2. Rehabilitation the secondary and tertiary irrigation channels including village roads.
3. Encourage the financial institution to finance the farm activities with credit scheme program.
4. In this region the role of agriculture extension services promoted to increase through the agriculture revitalization program, the service areas covered 246,026 hectare of rice field area and 368,537 hectare of estate crops area.
5. develop base line data on agriculture land used pattern, crops cultivation pattern, type of agriculture technology, soil fertility, rural household socio-economic data, the role of gender in agriculture as well as food and labor market in NAD.

Strengthening Agriculture Infrastructure

Strengthening agriculture infrastructure activities must be conducted for medium and long term planning within the year 2006 to 2009. Agriculture infrastructure need to support agriculture development program consists several important aspect, include:

1. Drainage rice field rehabilitation in lightly destroyed areas and proposed to build a new irrigation cannel in severely damaged agriculture areas.
2. Farm road rehabilitation to ensure road connectivity between farms, villages and markets.
3. Develop agribusiness system, to ensure farmers can reach their input required such as seed, seedlings and small livestock, fertilizer, pesticide, and others farm equipment; the local processing units operate with a

proper capacity to absorb local agriculture production (especially rice milling, palm oil processing units, coconut oil processing units, cocoa dryer, power threshers, corn shellers (shedder machine), feed mill enterprise, potato processing units become important in this stage), encourage agriculture transportation system between producers center to the market, develop marketing facilities to provide market support to agriculture and the rural economy.

4. Encourage financial institution to provide the required credit and others financial services to farmers and others stakeholders in rural economy including women, rural entrepreneurs, traders, and agro-processing industries. This include development of micro finance services.
5. Enhance the collaboration activities between scientist and farmers through participatory research to provide appropriate technology based on local specific condition, improvement the recommendation policy on agriculture development and improvement in farm incomes and livelihoods.
6. Encourage the establishment of extension staff to provide agriculture technology information's for farmers and establishing effective communication and coordination among stakeholder involved in agriculture development, to promote economic of scale in farm activities.

Conclusion and Recommendations

Post tsunami agriculture rehabilitation must be conducted based on the degree of damage of agriculture land in various affected villages. In a seriously damage areas, agriculture rehabilitation program need heavy equipments, technical assistance, including financial support to restore agriculture activities.

Agriculture rehabilitation program in various tsunami affected areas in NAD, must be conducted under the following direction:

1. Agricultural technology used in agriculture must consider the environment impact and the farms activities must be responsive to market demand.
2. Encourage agriculture development to be commercial oriented farming and consolidated the subsistence farming activities to economic of scale farming activities.
3. Develop agribusiness system, with emphasis on market demand.

The agriculture development program in tsunami affected area will be successful, if the agriculture development considers:

1. Establishing effective communication and coordination between stakeholders involved in agriculture development, from the central government, provincial level and kabupaten/kota level and develop a technical partnership with community recovery through the Kecamatan Development Project.
1. Encourage policy maker using the research recommendations in formulation the policy of agriculture development.
2. Preparing the financial fund for proper agriculture program to achieve the agriculture target.

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Appendix 1. Tentative Locations of Agriculture Project in Aceh's Tsunami Disaster Area.

Districts	Sub Districts	Number Affected Villages				
		Not Affected	Lightly	Moderately	Serverely	
1. Aceh Besar	Lhoong	4	-	-	24	
	Lhok Nga	8	-	7	11	
	Leupung	-	-	-	6	
	Peukan Bada	-	-	-	26	
	Baitussalam	2	-	2	9	
	Seulimueum	46	-	1	-	
2. Aceh Jaya	Teunom	20	-	-	14	
	Panga	14	-	-	5	
	Krueng Sabee	5	-	-	13	
	Setiabakti	5	2	-	4	
	Sampoiniet	24	-	-	13	
	Jaya	17	-	-	31	
3. Aceh Utara	Syamtalira Bayu	47	1	-	1	
	Seuneudon	21	3	2	7	
	Bakitya	80	-	-	-	
	Bakitya Barat	19	2	2	1	
	Samudera	32	1	1	6	
	Tanah Pasir	18	5	1	5	
	Muara Batu	16	1	-	5	
	Dewantara	15	-	-	-	
	4. Pidie	Meureudue	44	-	5	-
		Meurah Dua	16	-	3	-
Ulim		23	-	7	-	
Trienggadeng		23	-	4	-	
Panteraja		5	-	3	2	
Bandar Baru		41	-	1	-	
Glumpang baro		21	-	-	-	
Kembang Tanjong		28	-	10	7	
Simpang Tiga		29	-	15	8	
Kota Sigli		5	-	5	5	
5. Bireuen	Batee	20	1	4	2	
	Muara Tiga	8	-	9	-	
	Samalanga	30	-	11	5	
	Simpang Mamplam	22	1	14	1	
	Pandrah	15	2	-	-	
	Jeunieb	Na	na	na	na	
	Plimbang	11	na	4	na	

Districts	Sub Districts	Number Affected Villages			
		Not Affected	Lightly	Moderately	Serverely
6. Nagan Raya	Peudada	31	1	8	-
	Jeumpa	27	-	7	1
	Kuala	13	1	1	1
	Jangka	20	3	21	-
	Gandapura	34	-	3	1
	Kuta Blang	19	3	21	-
	Darul Makmur	44	-	-	9
7. Aceh Barat	Kuala	41	-	-	13
	Johan pahlawan	3	-	-	16
	Sama Tiga	12	-	-	20
8. Aceh Barat Daya	Arongan Lambalek	12	-	-	14
	Meureubo	15	-	-	9
	Manggeng	29	-	-	-
	Tangan Tangan	21	-	-	-
	Susoh	27	1	-	-
	Kuala Batee	17	1	-	-
9. Simeulue	Teupah selatan	3	3	-	-
	Simeulue Timur	2	13	6	2
	Teupah Barat	3	-	-	11
	Simeulue Tengah	-	9	7	1
	Teluk dalam	-	-	1	1
	Salang	-	-	1	3
	Semeulue barat	-	-	2	7
	Alapan	-	-	-	8
10. Aceh Timur	Bireum Bayeum	26	-	-	-
	Rantau Selamat	14	0	0	0
	Sungai raya	13	0	0	0
	Pereulak	14	0		
	Pereulak Timur	19			
	Pereulak barat	11			
	Idi rayeuk	38		2	7
	Darul Aman	44	0	1	0
	Nurussalam	40		2	
	Julok	32		3	
	Simpang Ulim	21			1
Madat	26		0	0	0

Sources: Calculated from Mapframe