

ESAP Chapter 4

Boxes, Figures and Tables

Table 4.1. Approaches for scenario development and impact assessment

Scenario	Focus	Time-line	Approach
IPCC SRES 2000	Climate Change	2100	Designed four different plausible world- <i>A1</i> : rapid economic growth; <i>A2</i> : fragmented world; <i>B1</i> : convergence with global environmental emphasis; and <i>B2</i> : local sustainability. The scenarios consistently describe the relationship between emission driving forces and their evolution over different time-line.
MEA 2005	Ecosystem	2050	Developed four plausible scenarios by combining qualitative storyline development and quantitative modeling of driving forces. The four scenarios are: <i>Adapting Mosaic</i> -recognizes extensive value of ecosystem services for human well-being; <i>Techno-garden</i> -proactive policies towards economic value of ecosystem services; <i>Global Orchestration</i> -technology development to fix damaged ecosystem; <i>Order from strength</i> -security and protection within national boundary and ecosystems are less important.
GEO (2002)	Environment	2030	Developed four scenarios through consultation and experience of other scenarios groups. <i>The Markets First</i> : market driven development; <i>The Policy First</i> : strong actions at national level for specific social and environmental goals; <i>The Security First</i> : high inequality and conflict caused by socio-economic and environmental stresses; and <i>The Sustainability First</i> : A world with the emergence of new development paradigm in responses to the challenges of sustainability.
FAO (2002)	Agriculture	2030/2050	Looked at different driving forces that lead the growth of global agriculture and food consumption. Discussed future prospects for food, nutrition, agriculture and major commodity group in the future.
IFPRI (2001)	Agriculture	2020	Examined alternative regional and global scenarios (optimistic and pessimistic) based on a number of driving variables. These variables are also affected by policy decisions on investment in agricultural research, irrigation, clean water, and health, population programs and economic policies.
World Bank (2006)	Agricultural Innovation	2030	Developed four scenarios polarizing Indian economy, agriculture and society along two axes of uncertainties (i) nature of governance (heavy State control/ interventionist to liberalized) and (ii) societal values/social fabric (highly individualistic to socially responsible). The four scenarios with implications spelt out for agriculture and investment in innovation, are (i) In the valley, (ii) Through the hills, (iii) On the edge, and (iv) Over the mountains.

Table 4.2: Regional population shares, 2004 and 2025 (%)

Region	Population Share 2004 (%)	Population share 2025 (%)
South Asia	42.3	46.2
South East Asia	15.4	15.7
East Asia	42.4	38.1

Source: Hussain et al. (2006)

Table 4.3: Status and future projection on percentage of women age 15-49 in some Asian Countries and regions

Country	Percent of women age 15-49 (2000)	Percent of women age 15-49 (2025)	Percent of women age 15-49 (2050)
Bangladesh	51	54	50
Bhutan	45	51	53
Brunei	56	50	43
Cambodia	46	52	52
China	56	45	40
Hong Kong	60	42	37
India	51	53	46
Indonesia	54	52	44
Japan	45	36	32
Laos	47	53	52
Macao	60	42	33
Malaysia	53	52	45
Mongolia	54	54	54
Nepal	47	52	53
North Korea	52	47	44
Philippines	51	55	46
Singapore	57	40	35
South Korea	58	42	37
Sri Lanka	56	49	41
Thailand	58	49	42
Vietnam	54	52	43

Source: United Nations. 2001. World population prospects: The 2000 revision. New York: Population Division, Department of Economic and Social Affairs.

Table 4.4: Sources of economic growth

		2005 – 10	2010 – 15	2015 – 20	2020 – 25
East Asia excluding Japan					
GDP		6.7	6.0	5.5	5.3
Contribution of:	Labor	0.4	0.3	-0.1	-0.1
	Capital	3.4	3.6	3.6	3.5
	TFP	2.8	2.2	2.1	2.0
Southeast Asia					
GDP		6.9	6.8	6.1	5.5
Contribution of:	Labor	1.0	0.8	0.6	0.4
	Capital	1.8	2.1	2.4	2.6
	TFP	4.4	4.2	3.4	3.0
South Asia					
GDP		7.0	6.1	5.7	5.3
Contribution of:	Labor	1.0	0.9	0.8	0.7
	Capital	2.2	2.2	2.2	2.2
	TFP	3.8	3.0	2.6	2.4
Developing Asia					
GDP		6.8	6.2	5.6	5.3
Contribution of:	Labor	0.6	0.5	0.2	0.1
	Capital	2.9	3.2	3.2	3.2
	TFP	3.2	2.7	2.4	2.2

Source: Roland-Holst et al. (2005)

Table 4.5: Projections of poverty by region

Region	Per cent of population living on/millions of people living on					
	less than \$1 per day			less than \$2 per day		
	2003	2015	2030	2003	2015	2030
East Asia and Pacific	11.5	2.8	0.8	40.2	15.5	6.7
	213	57	18	745	317	148
China	13.9	3.6	1.1	41.2	16.5	7.3
	179	50	16	531	229	108
Rest of East Asia and Pacific	6	1.1	0.2	37.7	13.5	5.4
	34	7	2	213	88	40
South Asia	33.2	16.2	8.1	79.5	60.2	46
	472	273	159	1131	1017	902

Source: World Bank (2007).

Table 4.6: Changes in the commodity composition of food demand (expressed in kcal/person/day)

	1969/71	1979/81	1989/91	1999/01	2030	2050
South Asia						
Cereals, food	150.4	151.1	164.3	157.1	167	169
Roots and tubers	16.9	19.9	18.7	23.5	31	36
Sugar (raw sugar eq.)	20.3	20.6	23.7	25.6	30	32
Pulses, dry	14.5	11.3	12.3	10.1	8	7
Vegetable oils, oilseeds and products (oil eq.)	4.6	5.8	7.2	9.7	15	18
Meat (carcass weight)	3.9	4.1	5.0	5.5	12	18
Milk and dairy, excl. butter (fresh milk eq.)	37.0	41.6	55.1	67.6	106	129
Other food (kcal/person/day)	84	89	104	141	180	200
Total food (kcal/person/day)	2066	2084	2329	2392	2790	2980
East Asia						
Cereals, food	152.2	181.4	199.5	186.7	176	162
Roots and tubers	96.6	80.8	57.1	65.8	61	53
Sugar (raw sugar eq.)	5.7	8.0	10.5	11.6	17	20
Pulses, dry	4.8	4.3	2.6	2.0	2	2
Vegetable oils, oilseeds and products (oil eq.)	3.5	4.7	7.8	10.6	15	17
Meat (carcass weight)	9.2	13.2	22.6	39.8	62	73
Milk and dairy, excl. butter (fresh milk eq.)	3.7	5.0	7.4	11.3	21	24
Other food (kcal/person/day)	98	121	179	322	405	440
Total food (kcal/person/day)	2012	2317	2625	2872	3190	3230
Note: Cereals food consumption includes the grain equivalent of consumption of beer and of corn sweeteners						

Source: FAO (2006)

Table 4.7: Climate change and adaptation measures in agriculture

Sectors	Adaptation Measures	AKST Challenges
Agriculture cropping	<p><i>Choice of crop and cultivar:</i></p> <p>Use of more heat/drought tolerant crop varieties in areas under water stress</p> <p>Use of more disease and pest tolerant crop varieties</p> <p>Use of salt-tolerant crop varieties</p> <p>Introduce higher yielding, earlier maturing crop varieties in cold regions</p> <p><i>Farm management</i></p> <p>Altered application of nutrients/fertilizer</p> <p>Altered application of insecticides/pesticides</p> <p>Change planting date to effectively use the prolonged growing season and irrigation</p> <p>Develop adaptive management strategy at farm level</p>	<p>-identification of appropriate gene</p> <p>-lack of resources for the development of varieties</p> <p>-time-lag between development; field trial, acceptability of farmers and onset of climate change</p> <p>-onset of new pests and diseases</p> <p>-Needs extensive research on nutrients and fertilizer requirements of new crop varieties</p> <p>-Changing planting date could have effect on yield</p> <p>-resources and technology require at grass roots level</p>
Livestock Production	Breeding livestock for greater tolerance and productivity	-breeding less climate sensitive livestock will be a formidable

	<p>Increase stocks of forages for unfavorable time periods</p> <p>Improve pasture and grazing management including improved grasslands and pastures</p> <p>Improve management of stocking rates and rotation of pastures</p> <p>Increase the quantity of forages used to graze animals</p> <p>Plant native grassland species</p> <p>Increase plant coverage per hectare</p> <p>Provide local specific support in supplementary feed and veterinary service</p>	<p>challenge</p> <p>-less climate sensitive grass and pasture varieties need to be developed</p> <p>-many native grassland species are not nutritious for animals</p> <p>-need resources, advanced technology for feed and veterinary service</p>
Fishery	<p>Breeding fish tolerant to high water temperature</p> <p>Improved fisheries management capabilities to tackle climate change</p>	<p>-cross breeding with fishes from arid region is a possibility but its effects on local varieties will be unknown for long period</p> <p>-Technology and resources will be major obstacle</p>
Development of agricultural Bio-technologies	<p>Development and distribution of more drought, disease, pest and salt-tolerant crop varieties</p> <p>Develop improved processing and conservation technologies in livestock production</p> <p>Improve crossbreeds of high productivity animals</p>	<p>-will emerge as technological challenge for poor countries</p> <p>-faster technological transfer is required</p> <p>-a new nexus between technology owners may emerge to take advantage of climate change</p>
Improvement of Agricultural Infrastructure	<p>Improve pasture water supply</p> <p>Improve irrigation systems and their efficiency</p> <p>Improve use/store of rain and snow water</p> <p>Improve information exchange system on new technologies at national as well as regional and international level</p> <p>Improve sea defence and flood management</p> <p>Improve access of herders, fishers and farmers to timely weather forecasts</p>	<p>-improved water store, supply and irrigation need new technologies and replacement of the old</p> <p>-dissemination of information on technology requires to build institutional capacity and educating farmers</p> <p>-improved sea defence and flood management have potentials but they have certain limits</p>

Note: This table is modified from Chapter 10: Asia of the IPCC WGII, Fourth Assessment Report (AR4), 2007. The Third Column is an addition by the ESAP Chapter 4 team.

Table 4.8: Biofuel policy initiatives in ESAP (Source: Raju, 2006)

Country	Source of Biofuel	Suggested Blending (%)	Issue of National Biofuel Policy/Act
China	Ethanol	10	2005
India	Ethanol, Jatropha oil, Pongamia oil	5 (with up to 10 for public transit)	2003
Japan	Ethanol	3	2003
Malaysia	Palm oil	5	2005
Thailand	Tapioca, Ethanol	10	2005
The Philippines	Coconut oil	10	2005

Table 4.9: Major uncertainties and likely impacts in the ESAP region

Key Uncertainties ¹	Drivers of change directly affected	Implications for agriculture, food systems, products and services	Implications for development and sustainability goals in the ESAP region
1. Climate change - sea level rise - temperature rise - and precipitation increase in certain parts (2015-2075) ²	Demographic changes Economic growth Agricultural growth	-Resurgence of tropical diseases- epidemics - High morbidity rates – increasing infant mortality -Reduced labour availability – -Unpredictable employment opportunities in agriculture and manufacturing -Factor productivity declines -Increasing food and commodity prices -Unstable markets -Decline in productivity of crops -Relative survival of C4 crops/plants given rising temperatures -Increase cost of production -Animal & crop diseases increase -Preservation +storage become very important -Deciduous forests incapable	-Poverty increases – especially in countries like India, China, Bangladesh, Myanmar, Philippines, Laos, Vietnam, Indonesia, and several Pacific countries, -Hunger and malnutrition increase -Civil strife - - inequity - Natural resource degradation rapid -Environmental sustainability challenged -Economic growth unsustainable -S&T response to production and productivity problems become hasty and emergency driven -Increasing loss of legitimacy of S&T -Governance and decision-making become more centralized -Crisis in democratic norms and values -Human development indicators plummet

¹ The approximate period during which these uncertainties and their impacts on key drivers unfold are in brackets.

² IPCC – (reference ----) – is used as a rough guide to this, though it is a euphemism to call ‘climate change’ an uncertainty.

³ Ulrich Beck (1992) points out that the end of capitalist industrial growth will be an endogenous phenomenon. There will be no revolution to overthrow industrial capitalism – “it will walk out of the economy silently, on its toes” after it has wreaked havoc on humanity and the ecosystem.

		<p>of regeneration</p> <ul style="list-style-type: none"> -Desertification increases -Crop/commodity production estimates, quality standards expected, etc. become unpredictable -Futures markets collapse -Higher market regulation with increasing loopholes -Capital demand increases in survival sectors (food, health, environment) -Returns to investment fall rapidly -End of capitalism³ 	
	Trade		
	Investment		
2. Regional conflicts or war (may start as water/energy related wars) (2015- 2030)	<p>Water (River water conflicts- India/China/ Myanmar/Thailand /Vietnam/Laos)</p> <p>Energy –</p>	<ul style="list-style-type: none"> - Irrigation water pricing enforced -Energy expensive – production costs increase -Urbanization slows down - Off-shore fishing collapses - Millions migrate – from coastal areas to hinterlands – from mountain terrains to hinterlands -China needs more resources to contain domestic inequities -India seeks collaboration for food/water/basic consumer goods -Increasing dependence on nuclear energy -Decentralized energy generation (mini/micro-hydels) collapse -Other non-conventional energy sources (including bio-energy increase) - Some gains in off shore oil gas – E China sea – Indian ocean – Pacific Ocean 	<ul style="list-style-type: none"> - Water conflicts – worsening law and order -Hunger and food crisis severe – global aid resolves some of it -Limited employment -Gender relationships and opportunities for employment for women worsen -Economic development in ESAP– grinds to a halt -Investments increase in water saving technologies, construction, agricultural and industrial production -Energy crisis hits economic activity -South Asian trade blocks collapse – East Asian trade controlled by China or China with Australian support -China emerges as the regional leader and economic powerhouse -Civil liberties curtailed

	Trade Economic growth	<ul style="list-style-type: none"> -Energy prices soar -Trade declines – duty and tariffs increase especially in agricultural trade - Collapse of regional cooperation -Decline in overall GDP growth and agricultural growth -State/public resources invested in arresting further decline in development indicators -Private domestic and global capital shift to investments to EU/LAC/ Africa 	
3. Global conflicts (2020-2030)	-Political stability - Globalization	<ul style="list-style-type: none"> -China withdraws its investments in the USA -USA perceives China as a threat⁴ – pro-active measures to contain Chinese growth/ regional presence -ESAP divided –Chinese vs. US allies -Collapse of WTO -EU vs. USA – sub-regional trade blocks -Labour mobility and capital transfers severely constrained -Global trade declines – in volume and share of national incomes -Market and investments shift outside the EU/USA to ESAP and LAC -Regional and sub-regional instability increases -Monitoring and regulations increase 	<ul style="list-style-type: none"> -Retrenchment and unemployment rates increase in USA and EU, and some ESAP countries -Worst global economic depression after the Great Depression -Economic growth limited to some pockets -China dominates ESAP region -sub-regional alliance between India, Australia, Japan and some other East Asian countries -Defense expenses escalate all over – armed forces movement increase.
4. Confederation of Asia-Pacific States	-Political stability	-Increasing internal strife + water/resource conflicts in	-Asia-Pacific Parliament emerges + some reorganization of existing nation

⁴ See Tammen (2006); Christensen (2006)

(2020-2050)	<p>-Climate change/energy crisis</p> <p>-Economic growth</p>	<p>countries</p> <p>-Negotiations – civil society and private sector led – with the State playing a facilitating role</p> <p>-Declining nationalism – replaced by a pan-Asian identity</p> <p>-Lack of faith in the UN to resolve local conflicts, detract authoritarian nation states in Asia (China, Sri Lanka, Myanmar, Thailand, etc.)</p> <p>-Political maturity – the South Asian Parliament and Boao Forum ideas considered seriously⁵</p> <p>-Federalism and democratic governance accepted by all the ESAP region countries and States within each country.</p> <p>-Fungible borders, shared internal problems (mal-nutrition, land degradation, terrorism, etc.) demand shared solutions</p> <p>-Climate change + Environmental sustainability demands systems understanding and shared costs and benefits beyond national boundaries</p> <p>-Regional co-operation and trade increase – at the cost of global trade initially.</p>	<p>states</p> <p>-\$ exchange rate replaced by the Yeng\$ (China-Japan-Australia-Singapore-Brunei lead) – one Asia-Pacific currency⁶</p> <p>-Unrestricted labour and capital mobility across Asia-Pacific states</p> <p>-Surface transport lines– from Turkey to Vladivostok</p> <p>-Economic integration among the sub-regional partner States given prime importance.</p> <p>-Human rights, ecological and democratic values articulated politically and accepted in civil life.</p>
-------------	--	--	---

1
2
3
4
5
6
7

⁵ The Boao Forum in Hainan Province – discussed China, SEA, EA. The South Asian Parliament was discussed at the SAARC Summit in Male in 1997 (Muni, 2004)

⁶ See Stiglitz (2006) *The Hindu* ---

Figure 4.1: Asian population trends (Source: DESA, 2006)

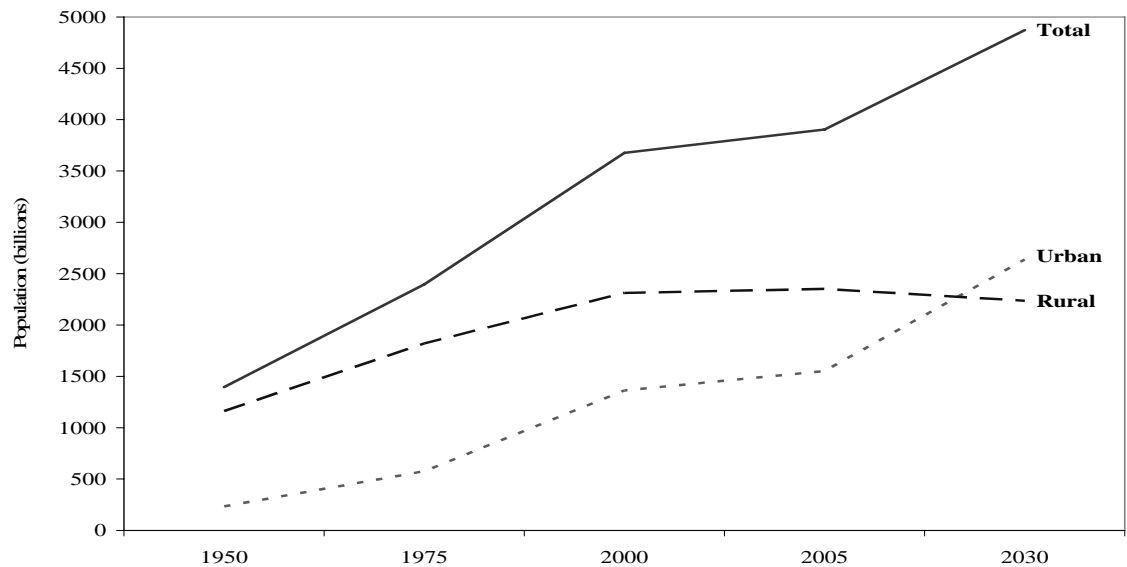
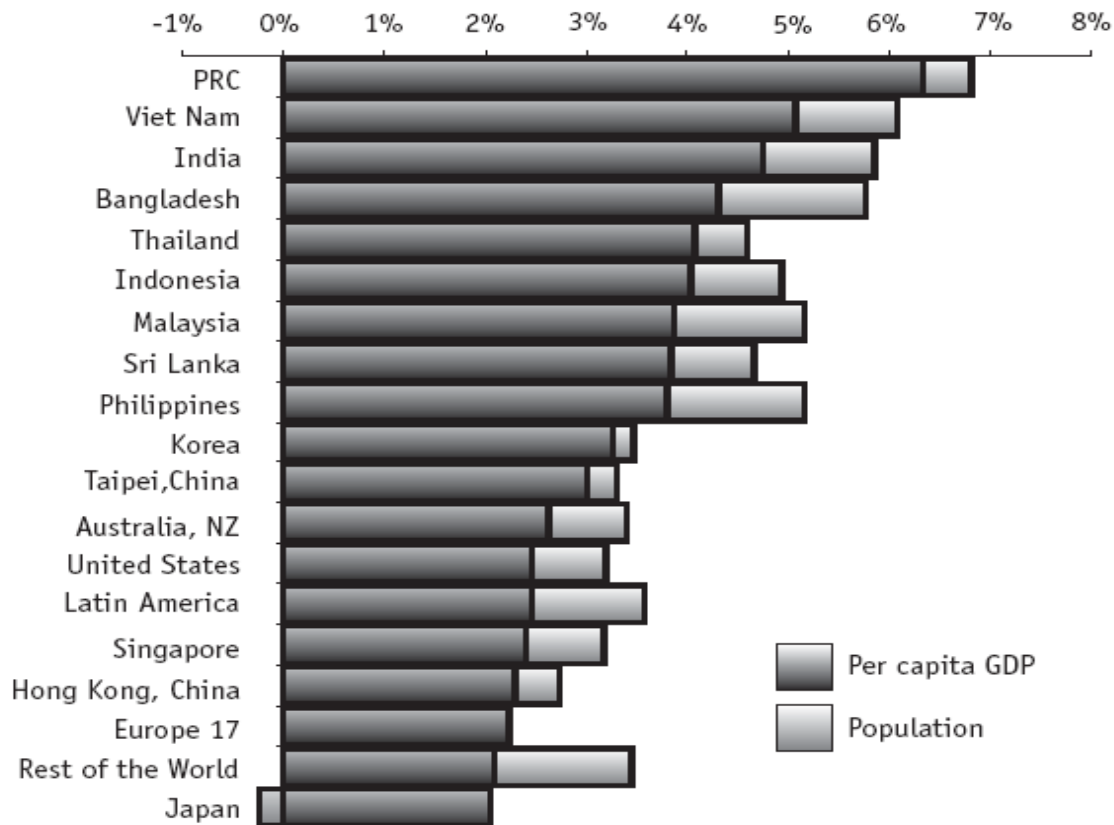


Figure 4.2: Baseline growth projections by ADB



Source: Roland-Holst et al. (2005)

Figure 4.3: Yield growth rates by region, all cereals. Source: Rosegrant et. al. (2001)

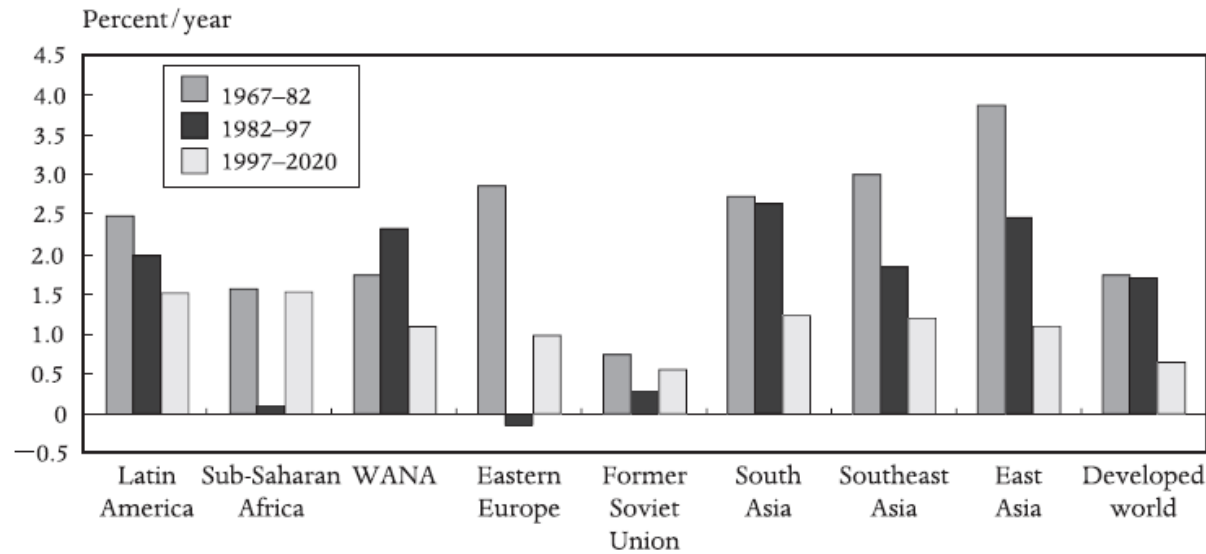


Figure 4.4: Decline in Water Resource Per Capita (1950-2025). Source: Asian Development Bank, 2001c, "Water for All: The Water Policy of the Asian Development Bank"

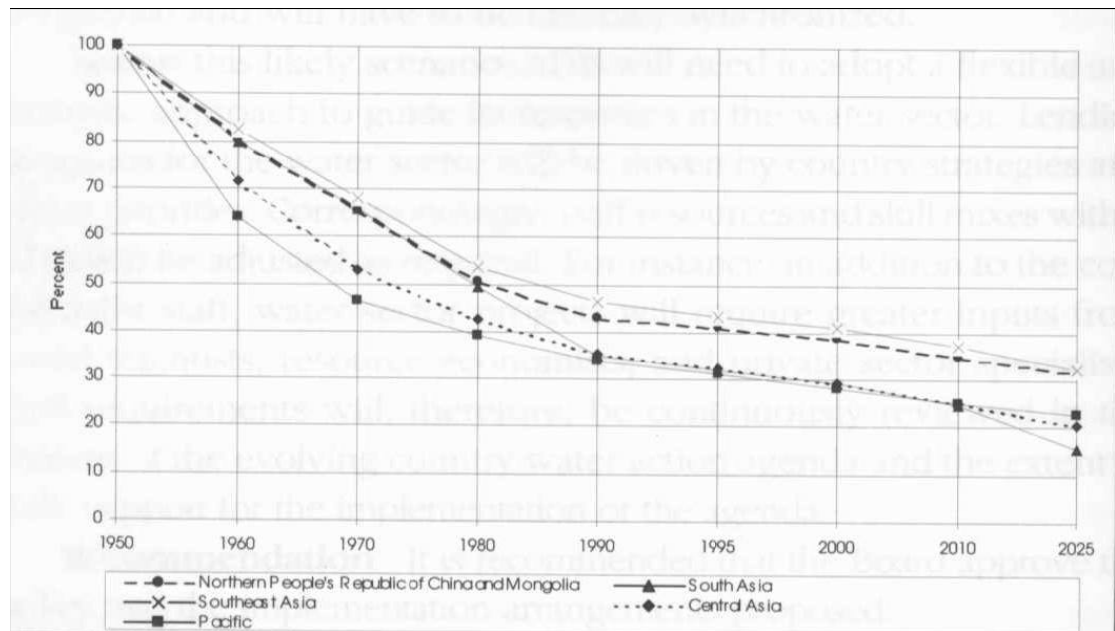


Figure 4.5: Various seasons crop calendar of Bangladesh (Source: Ahmed, 2004).

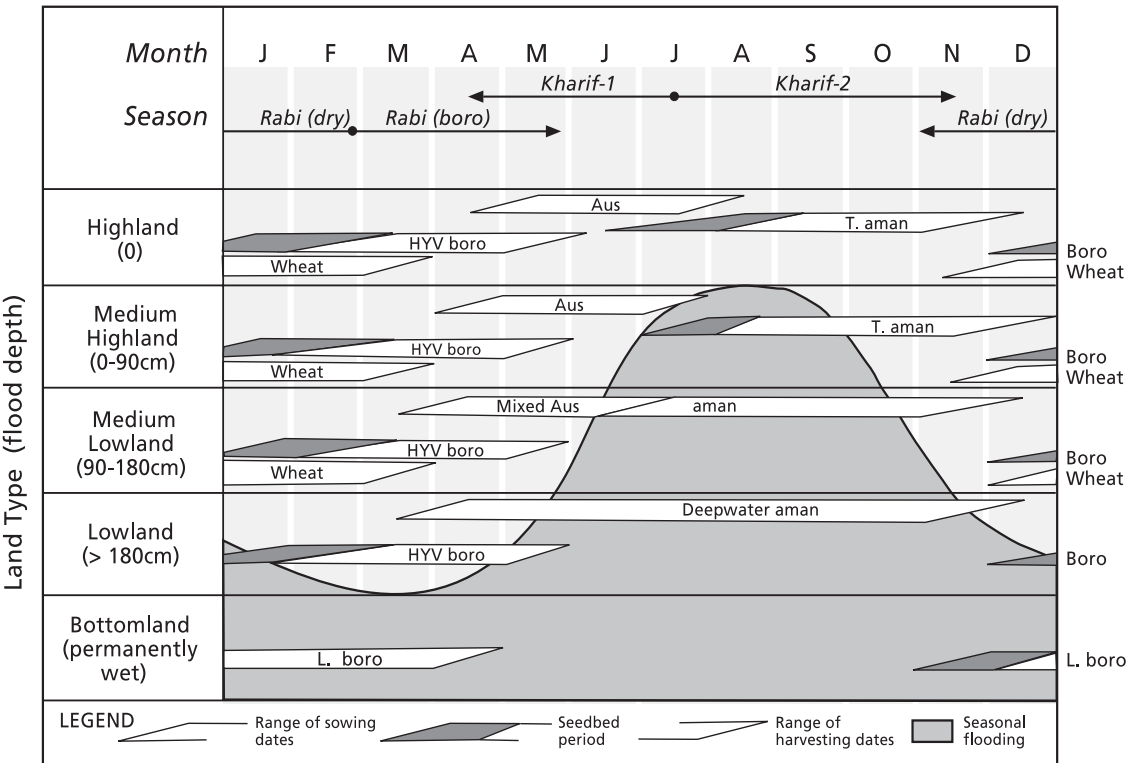
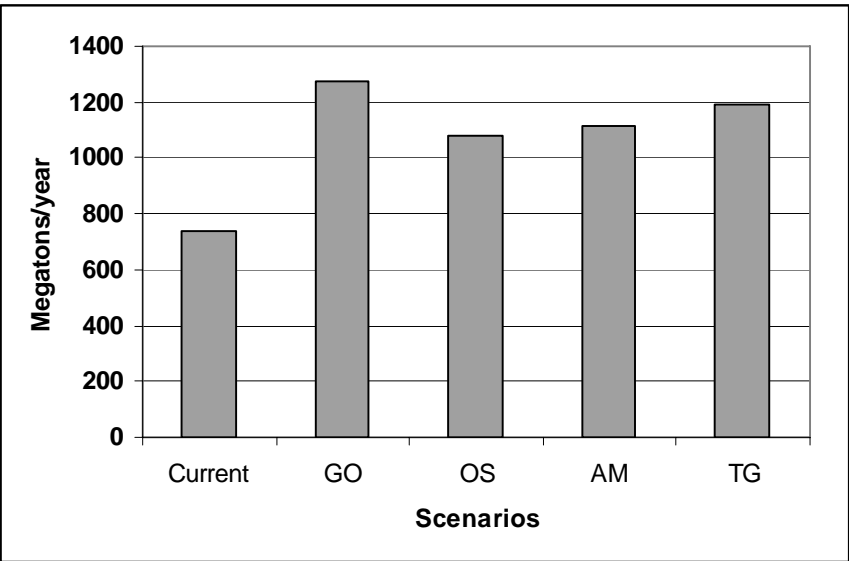


Figure 4.6: Cereal Production in Asia under four MA Scenarios in 2050. Scenario Names: GO: Global Orchestration; OS: Order from Strength; AM: Adapting Mosaic; TG: TechnoGarden (IMPACT).



1
2
3
4

Box 4.1: Points for future investment in human resources in Asia-Pacific region

The IFPRI vision 2020 highlights the need for investment in human resources in the Asia-Pacific region. Accordingly the countries here will have to:

Introduce new programs and strengthen existing ones to target the poor and disadvantaged at household and intrahousehold levels based on effective policy research.

Emphasize maternal and child health and nutrition programs.

Improve access to clean water and sanitation.

Provide safety nets for the poor and landless rural households affected by the new economic policy reforms.

Invest more in schooling, especially for girls. (IFPRI, 1995).

5
6
7
8
9