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Zoning of Bangladesh - An Exercise Based on Existing Cropping Practices

by

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I. INTRODUCTION

Current practices in zoning for the purpose of crop sector analyses in Bangladesh are often constrained by non-availability of data. The paper reviews some of these exercises (Section II) and presents an alternative set of zones based upon observed similarity in cropping patterns across 64 new districts (Section III). The exercise essentially involves finding vector distance and grouping vectors with low (intra-group) vector distance. Some data are presented to suggest of variability across the newly defined zones; and comparisons are also made with zones that are currently in vogue among development practitioners in Bangladesh (Section IV). Since data pertaining to the newly defined zones may be availed on a regular basis, it is hoped that the present exercise will be of greater use for policy planners and makers in the country.

II. REVIEW OF ZONING EXERCISES IN BANGLADESH AGRICULTURE

The major source of agricultural statistics in Bangladesh is the Bangladesh Bureau of Statistics (BBS). Data collected by the BBS are based on administrative units such as mouzas, upazilas and districts. The time series data are available for "Statistical Regions" that generally conform with the old districts. The census data are, however, available at a more disaggregated level.

In the absence of comprehensive data from any alternative source, researchers either fall back on district-level analyses or reconstruct the data base in terms of some convenient zones. One example of the latter is the exercise done by the Master Plan Organization (MPO). More than 350 catchment areas were identified by MPO and these were aggregated into 60 Planning Areas. For the purpose of assessing the impact of investments on water resources, such classification is quite helpful. In terms of the agriculture-related data base, however, one only gets a static picture and the dynamics is built into the system by resorting to land (elevation) - irrigation categories.[1]

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[1]Land under various land (elevation) - irrigation categories for each of the Planning Areas (PA) were identified for the base year; and percentage distribution of land under various crops were identified for each such category. Since investment affected the distribution of land within a PA across these categories, changes in area and production under various crops could be worked out.

While the BBS classification of regions reflect the administrative aspects of data collection and may be related to regional administrative units that plan and implement programmes, the MPO classification is essentially a hydrological zoning that is most relevant for analyzing investments on water sector. In contrast to these, the agroecological zones (AEZ) identified by the Bangladesh Agriculture Research Council (BARC) are supposedly more homogeneous (within) in terms of potentials in crop production. The AEZs account for variations in soil characteristics, climatic conditions and land elevation. While the BBS statistical regions (or, the administrative units) and the MPO planning areas are each territorially integrated, this is not so in case of the BARC-AEZs.

III. DATA SOURCE, METHODOLOGY AND FINDINGS

The three broad approaches to zoning in Bangladesh agriculture have been outlined in the previous section. The availability of data being the binding constraint, any attempt to aggregate data in terms of an alternative classification needs to be related with the administrative units. This is exemplified in the MPO exercise where each planning area had to be identified in terms of upazilas (either fractions or wholes). Ideally, one should also be able to reconstruct the BBS data in terms of the AEZs. The reliability would however diminish since one would have to work with smaller fractions (of upazilas) and aggregate over too many of such fractions. More importantly, such an exercise could only highlight on variability across agroecological zones and may have little use for planning purposes. With the objective to account for variations in agroecological characteristics (that are likely to reflect in current cropping practices) as well as to be able to relate the zones with BBS units (for which data are generally available), we have carried out a separate zoning exercise. The details on methodology and the outcomes of the exercise are outlined in this section.

It is assumed that prevailing "cropping practices" in various areas largely reflect their agroecological characteristics. Disaggregated information on cropping practices are found from BBS sources in terms of acreages under various crops. We use such 1983/84 agriculture census data to identify zones that are relatively more homogeneous within, in terms of the cropping practices.

We purposively confined to (new) district level data in order to limit the size of the exercise.[2] For each district, a normalized vector was obtained, each element of which effectively represented the percentage of gross cropped area allocated to a particular crop. Thus, for 64 districts, we had 64 such vectors. The purpose was to measure the distance between two vectors for various pairs of vectors,[3] and group these vectors in such a way that vector distances for various pairs within each group were minimal.

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[2]One could focus on upazila level data; this would, however, involve great deal more work and computer space.

[3]There were 4032 such pairs. It may be noted that for any two vectors, X_k and X_j where j and k stand for two districts, the square of the vector distance may be defined as $D^2_{jk}=\sqrt{(X_j - X_k)'(X_j - X_k)}$

It may be noted that normalizing the vectors was essential for our exercise. One may argue that the scalar differences, reflecting the differences in cropping intensities across districts, is lost in the process. It is however, necessary to recognize that cropping intensities are highly correlated with the mix of crops that are cultivated over a year. The loss in information due to focussing on normalized vectors may, therefore,.be of not much significance; especially when detail distinctions across crop varieties have been made.

Based on the earlier mentioned method, bilateral differences for all 64 districts were calculated. Districts among which bilateral differences were found to be minimal, were grouped into a zone.[4] For purpose of identification in this paper, we call them Cropping Pattern Zones (CPZ). Table A.1 in appendix presents the lists of districts under various zones, along with information on intra-zone variation. The zones are also mapped in Figure A.1; and quite surprisingly, they are territorially interlinked (within zones) in most cases. The outcome of our "empirical" analysis appear to be intuitively appealing. This aspect is further pursued in the following section.

IV. VARIATION ACROSS ZONES - SOME PRELIMINARY RESULTS

The present section attempts to address two inter-related questions; to what extent do the defined zones vary among themselves and how are they related to various other classifications made in the field of agriculture.

The exercise is based on census data; it is therefore appropriate to see how the zones differ in terms of the same set of data. Table A.2 summarizes the zone-specific land allocation (as percentage of net cropped area) under various crops/crop groups. One may observe significant variations across the defined zones in the cropping practices. The major wheat belt includes zones 5, 8, 9, 10, 11 and 12; jute is more extensively produced in zones 7, 8, 9 and 11; pulses in zones 2, 4, 8, 9 and 12; oilseeds in 1, 8, 9 and 10; and spices in 1, 2 and 9.

Data on crop production and land allocation under various crops were obtained under the BIDS-IFPRI study on Agriculture Diversification from areas selected from the zones identified in this paper. The village level data on land allocation under various crops, summarized in Table A.3, also suggest of wide variation across different zones identified.

Distribution of land in each of the newly defined zones by BARC-defined land elevation classification are presented in Table A.4. Other than few zones such as 1, 2, 3, 13 and 15, no clear association may be established between a zone and any particular land elevation category. The picture, however, gets more concretized when AEZs are related with the newly defined zones (see Table A.5).[5] In case of six out of 15 zones, most land in any one zone are accounted for by two or less AEZs; while for another eight zones,

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[4]A number of critical values of D were experimented with prior to final selection. Formally, given a critical value for D, a zone may be defined as a subset of the index set I as follows: $Z = \{ZCI/V_j,\ KEZ,\ D_{jk} \leq D\}$

[5]The details are presented in Table B.1 in appendix. Also see Figure A.2 in the appendix for location of various AEZs.

they are accounted for by four or less AEZs. In only zone number 10, there are wider representation of AEZs.

The association of the newly defined zones with the MPO planning areas is not quite smooth (see Table B.2 in the Appendix).[6] Except in the case of zone number 8, all other zones have fractions of some planning areas. This is quite expected since the catchment areas and therefore the planning areas include fraction of upazilas in many cases. In spite of the discrepancy, the association established in Table B.2 may enable one to check for data consistency in MPO's investment analysis.

The CPZs, presented in this paper, account for administrative units on which data are collected on a regular basis. While AEZs and Planning Areas of MPO are more rigorously defined in technical terms; their applications on time-series data are not feasible. One strategy may therefore be to generate future data in terms of the more rigorous classifications. Alternatively, one may choose to apply the suggested CPZ classifications on existing data.

[6]Also see Figure A.3 in the appendix for location of MPO Planning Areas.

Appendix

TABLE A.1

IDENTIFICATION OF CPZ

Zone Number	Districts	Range*	Comment*
1.	Bandarban, Khagrachari & Rangamati	389-720	Bandarban-Khagrachari (720), Others within 503
2.	Bhola, Barguna & Jhalakati	219-919	Barguna-Jhalakati(919), others within 471
3.	Khulna, Patuakhali and Satkhira	236-363	
4.	Barisal, Luxmipur, Maulavibazar, Noakhali, Pirojpur & Sylhet	85-478	Barisal-Maulavibazar (478), Luxmipur-Sylhet (402), Others below 300
5.	Bogra, Joypurhat & Naogaon	77-319	
6.	Chittagong & Feni	233	
7.	Gazipur, Jamalpur, Kishoreganj, Narshingdi, Netrokona & Tangail	139-552	Jamalpur-Kishoreganj (552), Kishoreganj-Tangail (529), Others below 460
8.	Chuadanga, Jessore, Kushtia, Jhenaidah, Magura & Meherpur	79-516	Jessore-Kushtia (516), Others below 488
9.	Faridpur, Gopalganj, Madaripur, Manikganj, Munshiganj, Narail Pabna, Rajbari & Sariatpur	51-697	Gopalganj-Munshiganj (697), Manikganj-Munshiganj (609), Manikganj-Narail (604), Gopalganj-Pabna (562), Gopalganj-Rajbari(501), Others are below 495 of which five are even below 100
10.	Brahmanbaria, Chandpur, Comilla, Dhaka, Hobiganj, Narayanganj, Natore & Serajganj	26-537	Comilla-Narayanganj (537), Hobiganj-N.Ganj (518), Comilla-Natore (512), Comilla-Hobiganj (511), Comilla-B.Baria (507), Others are below 493
11.	Dinajpur, Gaibandah, Kurigram, Lalmonirhat, Mymensingh, Nilphamari, Panchagarh, Rangpur, Sherpur & Thakurgaon	42-499	
12.	Nawabganj & Rajshahi	351	
13.	Sunamganj	-	Minimum with Hobiganj (1648)
14.	Cox's Bazar	-	Minimum with Chittagong (713)
15.	Bagerhat	-	Minimum with Pirojpur (970)

* Figures are calculated values of D, which is the square of vector distance.

TABLE A.2

PERCENTAGE OF NET CROPPED AREA UNDER VARIOUS CROPS, BY ZONES, 1983/84

Zone No.	HYV/ *Pajam Aus*	Total *Aus*	HYV/ *Pajam Aman*	Total *Aman*	HYV/ *Pajam Boro*	Total *Boro*	Total Wheat	Total Minor Cereals	Jute
1	11.56	47.64	18.94	34.26	14.08	21.21	0.23	7.90	0.91
2	4.10	41.02	2.50	92.49	2.49	3.47	0.88	0.23	0.92
3	0.85	19.49	1.85	86.62	2.13	3.01	0.55	0.12	3.70
4	6.44	52.60	5.36	77.59	3.92	10.46	0.41	0.95	1.86
5	4.73	25.04	10.74	74.72	22.86	25.06	8.21	0.99	5.82
6	17.65	55.95	39.81	88.77	25.63	28.34	0.12	0.20	0.10
7	3.78	33.96	8.39	45.23	25.69	36.39	4.32	2.95	15.52
8	4.21	48.08	7.14	38.37	1.71	2.21	10.90	2.28	16.12
9	1.40	46.47	0.99	54.16	2.26	7.53	10.27	3.81	14.51
10	5.73	37.45	10.13	55.05	21.24	25.94	11.97	3.62	8.74
11	6.10	48.66	10.23	73.37	5.18	7.81	9.59	5.91	13.14
12	1.55	41.61	2.54	45.09	5.49	9.24	10.04	4.60	3.70
13	0.61	10.10	1.79	28.39	10.57	65.47	0.44	0.32	1.02
14	16.30	24.23	59.77	75.45	33.18	38.01	0.03	0.39	0.03
15	1.55	14.45	1.05	85.09	0.76	4.85	0.07	0.18	1.42

(Contd.)

TABLE A.2 *(Contd.)*

Zone No.	Cotton	Sugar-cane	Tobacco	Potato/ Sweet Potato	Total Pulses	Total Oil Seeds	Total Vegeta-bles	Total Spices	Percentage of NCA under-irri-gation
1	11.49	0.34	2.14	3.29	1.56	17.89	35.09	15.68	10.09
2	0.00	0.34	0.04	3.54	18.59	3.53	5.78	7.15	5.18
3	0.04	0.47	0.12	1.41	9.41	5.01	4.96	2.30	5.66
4	0.00	0.61	0.07	1.91	11.83	3.26	5.79	4.70	9.43
5	0.02	1.38	0.02	4.76	2.21	2.52	6.62	3.79	39.52
6	0.00	0.33	0.19	2.73	8.44	1.68	8.74	4.07	33.22
7	0.03	1.62	0.45	2.54	6.04	9.72	5.76	3.14	32.83
8	0.78	5.63	1.19	0.42	25.08	10.59	3.70	2.77	16.07
9	0.03	3.21	0.30	2.13	29.31	16.89	5.05	7.13	7.41
10	0.02	2.16	0.16	3.50	8.01	12.32	7.34	3.56	28.36
11	0.03	1.86	2.59	3.01	4.87	3.79	5.46	2.51	16.95
12	0.04	6.39	0.01	1.58	19.75	5.11	4.00	2.53	18.49
13	0.00	0.12	0.30	1.08	0.37	2.73	2.42	0.98	38.24
14	0.01	0.11	0.53	1.61	1.16	1.56	3.81	4.15	37.42
15	0.01	1.75	0.10	0.80	4.20	2.75	4.22	1.76	2.74

Source: Calculated from 1983/84 Census data.

TABLE A.3

PERCENTAGE OF TOTAL CROPPED AREA UNDER VARIOUS CROPS, BY ZONE

No.	Crop	Zone														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Bangla-desh
1	Broadcast *Aman*	-	2.17	-	21.62	-	-	-	-	2.84	8.63	-	-	2.61	-	3.35
2	Local T. *Aman*	3.07	30.72	9.50	13.35	13.35	15.90	-	1.25	15.65	4.79	21.18	11.44	0.86	23.15	11.75
3	*Pajam Aman*	18.91	4.63	-	0.20	-	2.67	-	-	1.20	-	-	-	7.65	-	0.62
4	MV *Aman*	28.74	17.53	29.82	15.85	24.96	22.12	24.23	31.37	5.23	25.53	12.99	13.81	35.24	17.21	19.65
5	Local *Aus*	-	2.17	4.26	13.37	4.89	6.78	11.66	3.05	15.59	4.84	2.91	27.32	10.10	6.02	7.57
6	MV *Aus*	15.12	-	2.59	4.38	11.95	9.35	-	19.61	2.40	21.50	14.35	2.51	2.01	13.30	10.11
7	Local *Boro*	-	-	-	6.05	0.085	1.86	-	-	8.41	-	-	-	0.39	8.16	1.61
8	MV *Boro*	22.22	7.97	21.96	12.03	24.25	23.40	28.07	1.30	10.96	11.42	9.21	9.99	24.70	3.21	15.19
9	Wheat	-	0.28	4.83	0.31	8.45	0.37	1.20	4.40	1.49	4.63	6.10	1.67	2.61	-	3.52
10	Minor Cereals	-	0.14	-	-	-	-	-	-	0.08	-	-	-	-	-	0.01
11	Spices	0.47	6.08	0.49	1.82	0.08	0.95	5.11	0.76	2.93	1.56	3.18	-	1.38	-	2.11
12	Pulses	1.65	3.33	4.46	2.94	1.59	6.02	4.20	9.25	9.15	4.82	-	24.10	0.65	7.36	4.90
13	Vegetables	4.83	1.01	4.75	1.02	0.22	2.72	9.31	7.84	1.53	0.70	8.36	0.57	2.51	14.00	4.33
14	Potato/S.Potato	4.86	17.67	1.23	1.11	2.62	2.86	-	0.27	0.19	2.11	4.58	0.35	1.69	-	2.30
15	Jute	-	-	12.43	3.25	2.53	0.15	0.76	7.47	4.95	3.59	4.41	4.53	-	-	4.10
16	Sugarcane	-	-	1.18	0.21	-	0.60	13.81	8.40	11.09	0.05	0.93	0.43	-	2.86	3.40
17	Oilseeds	0.28	6.23	2.48	2.24	3.13	2.98	0.57	2.80	3.06	5.02	5.26	3.26	7.44	-	3.40
18	Watermelon	0.09	-	-	0.04	-	0.46	-	-	0.05	-	-	-	0.08	-	0.02
19	Ground Nut	-	-	-	0.02	-	0.42	0.076	-	0.23	-	-	-	0.05	-	0.04
20	Betel Leave	-	-	-	-	0.056	-	-	1.63	-	-	-	-	-	4.68	0.20
21	Braus	-	-	-	-	0.94	-	-	-	-	0.13	2.65	-	-	-	0.60
22	Tobacco	-	-	-	-	-	0.24	-	1.47	2.54	0.65	-	-	-	-	0.40
23	Arum	-	-	-	-	-	0.12	0.23	-	-	-	-	-	-	-	0.02
24	Banana	-	-	-	-	-	-	0.70	0.48	-	-	-	-	-	-	0.10

Note: For Bangladesh, weighted average of zone figure are obtained
Source: Village level data of Cropping Pattern, BIDS–IFPRI Survey.

TABLE A.4

DISTRIBUTION OF LAND BY LAND ELEVATION CLASSIFICATION

(raw percentage)

Zone No.	H	HM	ML	L	VL	Total
1	98.33	1.67	0.00	0.00	0.00	100.00
2	0.46	93.85	5.69	0.00	0.00	100.00
3	10.52	79.87	8.26	1.35	0.00	100.00
4	22.45	48.27	13.80	15.48	0.00	100.00
5	40.34	44.69	8.57	6.40	0.00	100.00
6	50.80	41.81	7.14	0.25	0.00	100.00
7	26.51	33.25	20.80	16.49	2.96	100.00
8	43.65	37.13	15.75	3.47	0.00	100.00
9	14.35	31.45	32.05	18.39	3.76	100.00
10	16.46	28.31	29.25	22.22	3.76	100.00
11	39.84	53.35	5.98	0.84	0.00	100.00
12	60.63	22.49	12.79	4.08	0.00	100.00
13	6.42	11.88	26.38	35.13	20.19	100.00
14	62.27	24.76	12.97	0.00	0.00	100.00
15	7.62	74.96	13.13	4.28	0.00	100.00

Note: H = high (upto 30 cm.), HM = high-medium (30 to 90 cm.), ML = Medium-Low (90-180 cm.), L = Low (180-360 cm.), and VL = very low (above 360 cm. flood depth).

TABLE A.5

ASSOCIATION OF AEZ WITH THE CPZ

CPZ	AEZ
1.	29 (100%)
2.	13 and 18 (100%)
3.	13 (72%) and 11 (13%)
4.	13, 18, 20 and 29 (80%)
5.	25 (46%; 3 and 4 (32%)
6.	23 and 29 (87%)
7.	8, 9 and 28 (73%)
8.	11 (76%)
9.	12 (56%); 10 and 14 (23%)
10.	19 (33%); more widely distributed
11	1, 3 and 9 (71%)
12.	11 (54%); 10 and 26 (39%)
13.	21 (68%); 20 and 22 (31%)
14.	23 and 29 (100%)
15.	13 (69%); 11, 12 and 14 (31%)

Appendix B

TABLE B.1

DISTRIBUTION OF CPZ LAND BY AEZ

(row percentages)

CPZ \ AEZ	1	2	3	4	5	6	7	8	9	10	11
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.61
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.007
5	0.00	0.00	19.91	12.47	5.67	0.77	3.06	0.00	0.00	0.00	1.36
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	4.46	23.35	28.98	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.86	76.24
9	0.00	0.00	0.00	0.88	0.00	0.00	1.14	7.91	0.00	11.88	4.40
10	0.00	0.00	0.00	9.87	3.20	0.00	3.28	4.94	2.01	1.19	6.75
11	19.50	3.24	38.00	0.00	0.00	0.00	3.26	4.16	13.94	0.00	0.00
12	0.00	0.00	0.55	0.00	0.52	1.07	0.00	0.00	0.00	13.94	53.89
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.56

TABLE B.1 *(Contd.)*

(row percentages)

CPZ \ AEZ	12	13	14	15	16	17	18	19	20	21	22
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	52.70	0.00	0.00	0.00	47.30	0.00	0.00	0.00	0.00	0.00
3	1.26	71.66	6.55	0.00	0.00	0.00	7.92	0.00	0.00	0.00	0.00
4	0.72	20.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	7.40	6.09	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	2.17	0.00	0.00	0.00	0.00	10.29	6.35
8	4.43	0.00	3.26	0.00	2.27	4.40	0.07	6.47	0.00	0.00	0.00
9	55.71	0.14	10.75	0.83	0.92	0.00	0.00	5.44	0.00	0.00	0.00
10	3.46	0.00	0.00	0.27	5.87	2.76	0.04	32.70	2.60	4.11	6.06
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.64
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.72	68.29	18.37
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	7.12	69.17	11.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B.1 *(Contd.)*

(row percentages)

CPZ \ AEZ	23	24	25	26	27	28	29	30	Total
1	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
4	0.00	0.00	0.00	0.00	0.00	0.00	12.00	0.00	100.00
5	0.00	0.00	45.52	8.99	2.26	0.00	0.00	0.00	100.00
6	43.86	0.00	0.00	0.00	0.00	0.00	42.65	0.00	100.00
7	0.00	0.00	0.00	0.00	0.00	21.04	0.25	0.00	100.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
10	0.00	0.00	2.40	0.00	0.00	3.81	3.87	0.81	100.00
11	0.00	0.00	5.60	0.00	4.51	3.68	0.47	0.00	100.00
12	0.00	0.00	5.15	24.87	0.00	0.00	0.00	0.00	100.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	100.00
14	40.30	0.41	0.00	0.00	0.00	0.00	59.29	0.00	100.00
15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.0

TABLE B.2

ASSOCIATION OF CPZ WITH MPO PLANNING AREAS

CPZ	MPO Planning Areas
1	38,39, part of (37)
2	Parts of (55, 54, 52)
3	Parts of (49, 59, 55)
4	35, 26, parts of (24, 25, 50, 52, 53, 56, 60)
5	Parts of (8, 6, 9, 11)
6	36, parts of (39, 10, 11, 60)
7	15, 29, parts of (16, 18, 20, 21, 22, 30, 17)
8	42, 43, 45, 46, 47, 58
9	44, 51, 57, parts of (14, 17, 30, 50, 56)
10	28, 31, 32, 17, parts of (6, 14, 16, 17, 18, 30, 33, 34)
11	1,2,3,4,5,7,10, parts of (8,18,19,20,21,22)
12	12, parts of (9, 11)
13	23, 27, parts of (24)
14	Parts of (10, 11)
15	Parts of (49, 59)

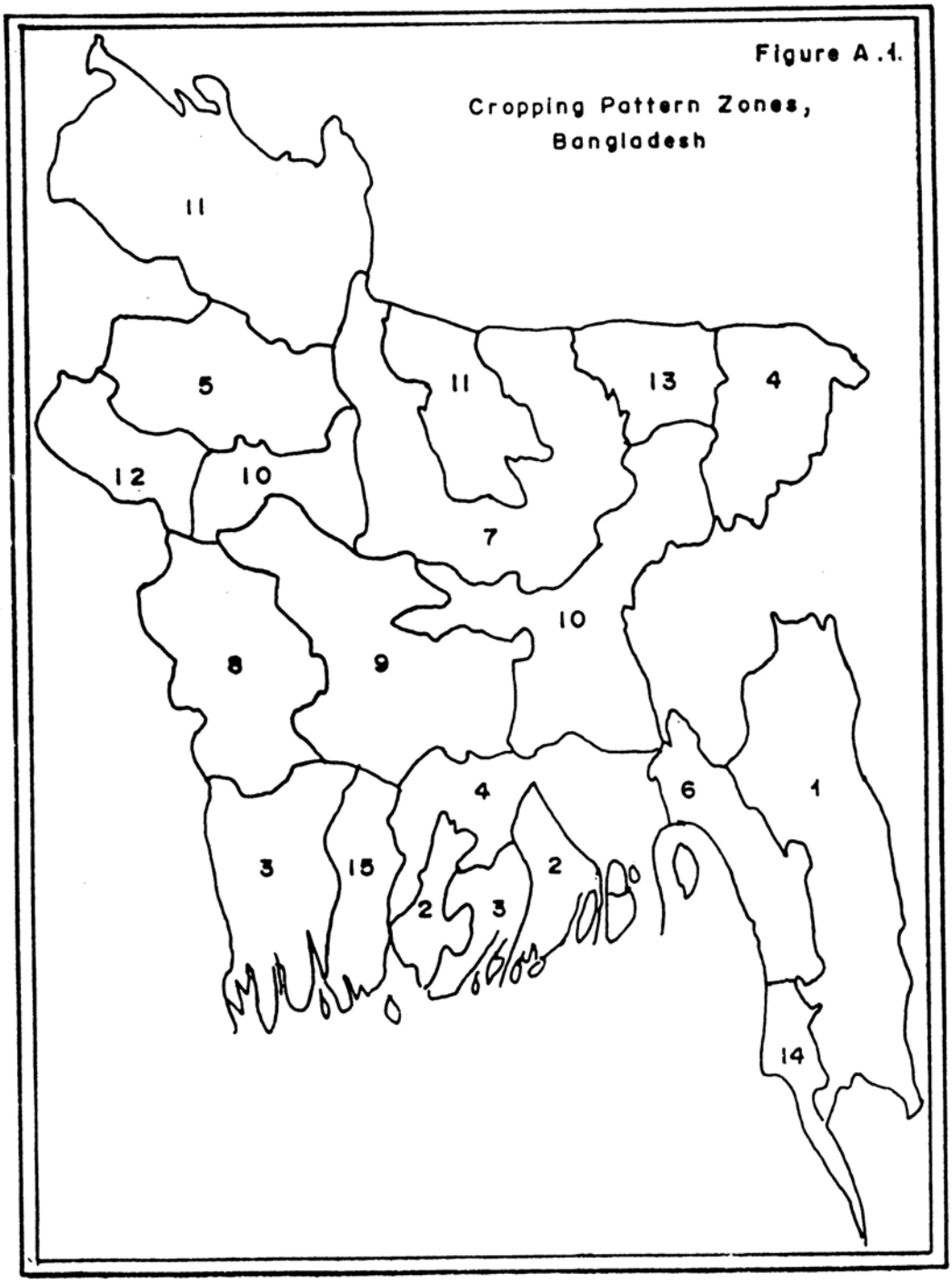
Figure A.1.
Cropping Pattern Zones,
Bangladesh
11
5
11
13
4
12
10
7
10
8
9
4
6
1
3
15
2
3
2
14

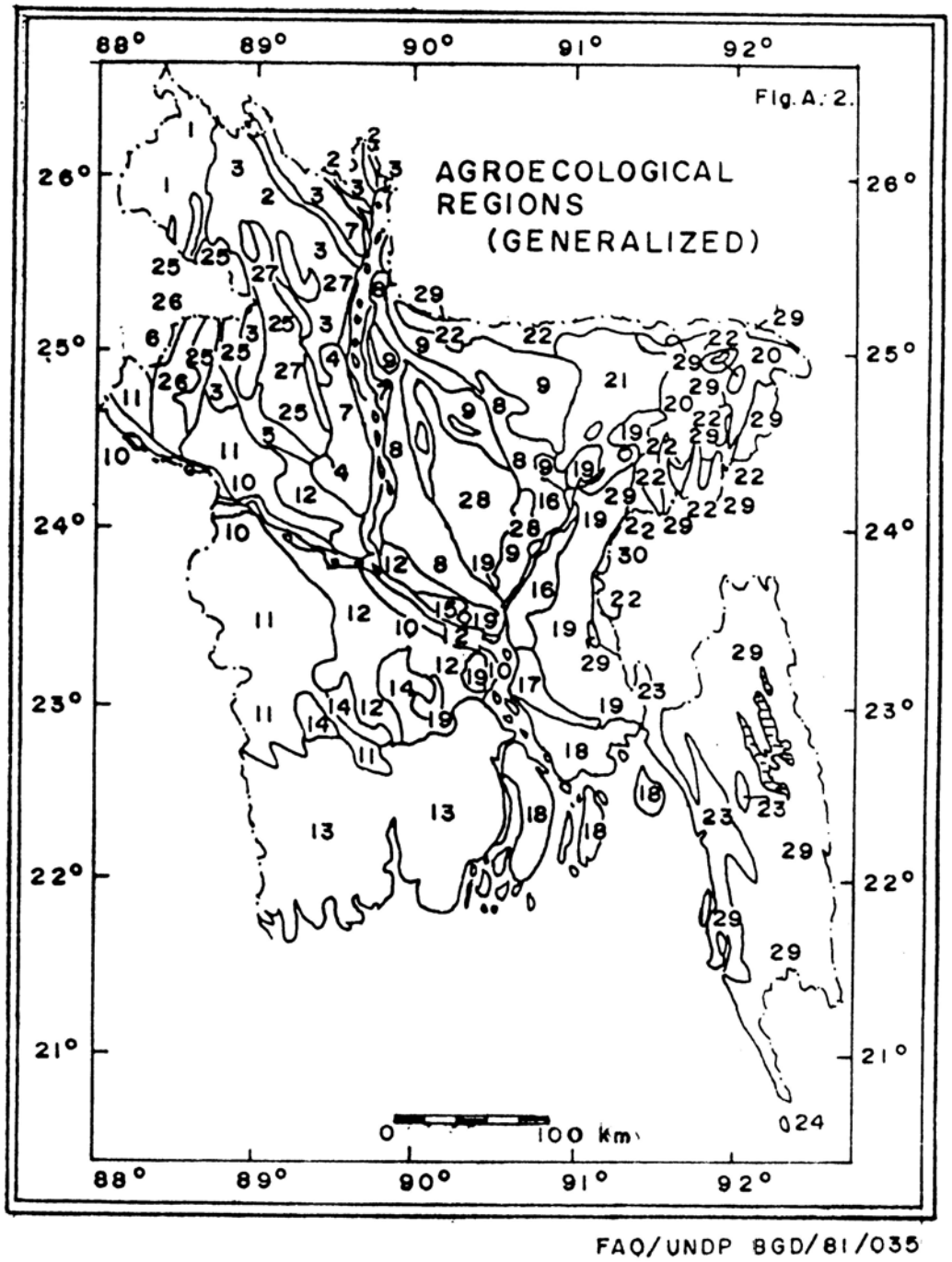
Fig. A. 2.
AGROECOLOGICAL
REGIONS
(GENERALIZED)
88°
89°
90°
91°
92°
26°
25°
24°
23°
22°
21°
0
100 km
024
FAO/UNDP BGD/81/035

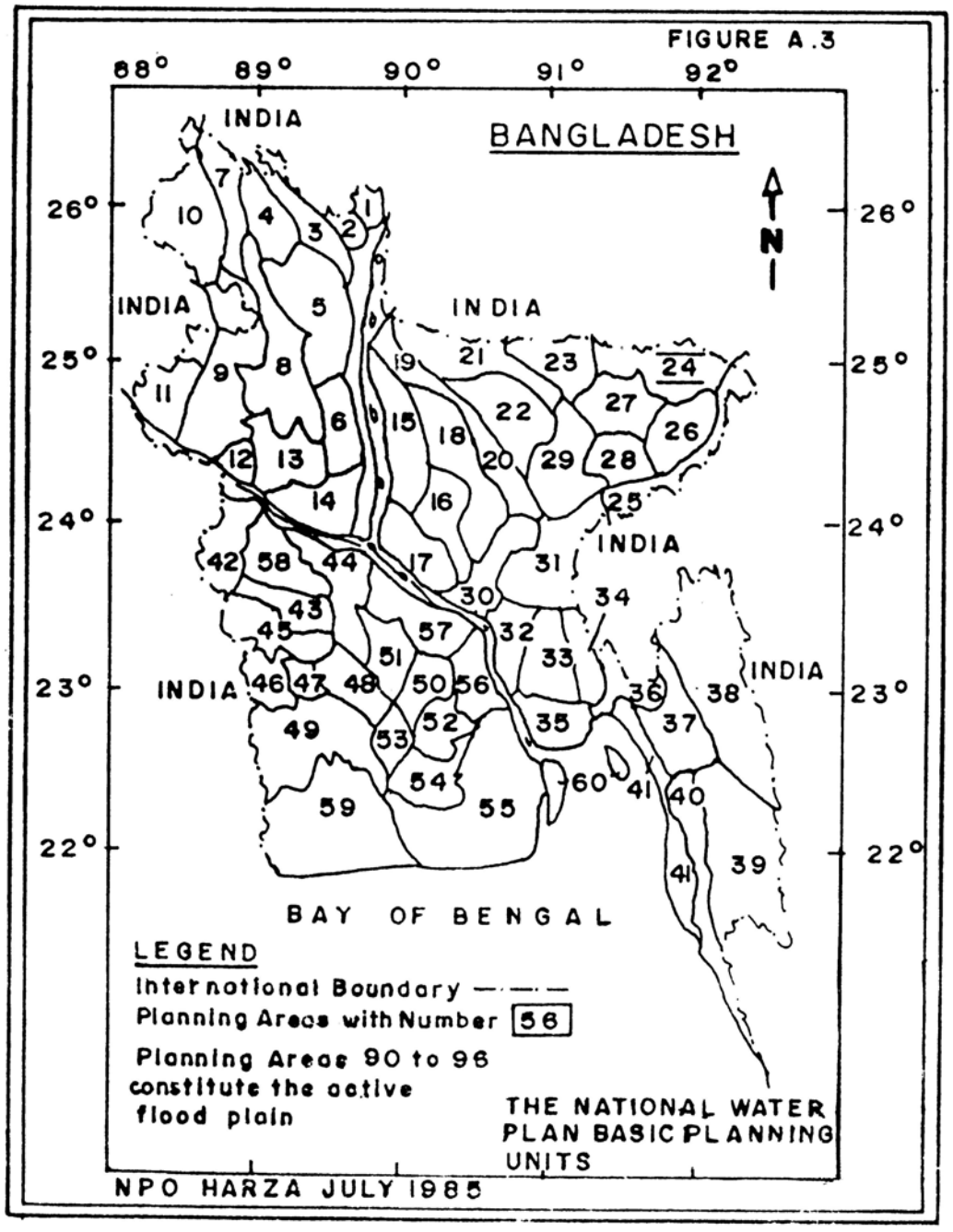
FIGURE A.3
88°
89°
90°
91°
92°
26°
25°
24°
23°
22°
INDIA
BANGLADESH
N
BAY OF BENGAL
LEGEND
International Boundary
Planning Areas with Number 56
Planning Areas 90 to 96 constitute the active flood plain
THE NATIONAL WATER PLAN BASIC PLANNING UNITS
NPO HARZA JULY 1985