NODAL MIGRATION REGIONS OF THE PHILIPPINES

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The two most prominent features of internal migration in the Philippines are: (1) the movement from rural to urban areas and (2) the southward movement of Roman Catholics to agricultural settlements on the island of Mindanao (Keely, 1973). These two characteristics, as well as other properties of population flows within the Philippines, can be discerned in the analytical results reported here. They are derived through the application of a multiterminal network flow algorithm (Frank and Frisch, 1971, chap. 5), by which nodal in and out-migration regions can be found, to a 55 x 55 1960 lifetime interprovincial migration table (Census of the Philippines, 1960).

An out-migration nodal region is defined here as one for which fewer people were born in the region and lived outside it in 1960 than were born in its nodal province (A) and were residing outside A in 1960. For an in-migration nodal region, fewer people were born outside the region and lived within it in 1960 than were born outside its nodal province (B) and resided in B in 1960. For example, Bukidnon and Misamis Oriental form an out-migration nodal region, with the latter province serving as the node (Table 1, Region 10). 5,421 people were enumerated as born in Bukidnon and living in another province in 1960. For Misamis Oriental, the corresponding figure was 57,872. 2,066 people born in Bukidnon lived in Misamis Oriental in 1960, while 23,843 of those born in Misamis resided in 1960 in Bukidnon—the southern plains of which have been developed as resettlement sites. Therefore, 5,421 + 57,872 - 2,066 - 23,843, or 37,384 people, were born in the region formed by these two provinces, and lived in another of the 53 provinces in 1960. Since 37,384 is less than 57,872, the provinces do form an out-migration nodal region.

Collections of provinces which meet the criteria for a nodal region can be found by finding the maximum flow and minimum cut between all 55 x 54 (2,970) ordered pairs of provinces, treating the migration table as a matrix of network capacities (Ford and Fulkerson, 1962; Nijenhuis and Wilf, 1975, chap. 18). Most cuts involve the separation of one province from all others. However, some cuts are non-trivial; i.e., they separate the 55 provinces into two groups, both of which contain more than one province. Of these two groups, the one with the smaller number of members is regarded as a region. The nodal regions obtained from the 1960 lifetime interprovincial migration matrix for the Philippines are presented in Tables 1 and 2. The ratio—which can serve as a measure of regional identity—of regional migration to nodal migration is also given. Lower values indicate more strongly defined regions.

Sixteen states function as nodes of out-migration regions (Table 1). They are Antique, Batangas, Bohol, Capiz, Cebu, Iloilo, Leyte, Manila, Misamis Occidental, Misamis Oriental, Negros Occidental, Negros Oriental, Nueva Ecija, Pangasinan, Romblon, and Surigao. Regions 9, 10, and 16 are based on migration within Mindanao. The five Visayan provinces of Antique, Bohol, Capiz, Negros Occidental, and Negros Oriental are grouped solely with Mindanaoan ones, while the three of Cebu, Iloilo, and Leyte also have the southern Luzonian urban province of Rizal within their migration field. The prosperous island of Negros, together with Palawan and Sulu, are in the nodal regions associated with Cebu and Iloilo. The north and east of Palawan have been settled by Roman Catholic migrants.

Batanes is grouped with each of Bukidnon, Lanao del Sur, Negros Oriental, and Tarlac—which serve as nodes—in four two-member in-migration nodal regions (Table 2). Batanes, the northernmost and smallest province, is rugged, rocky, and wind-swept. Its population has increased only slightly since 1900, since there has been a steady migration to kinder environments.

Five Mindanaoan provinces—Agusan, Cotabato, Davao, Lanao del Norte, and Zamboanga del Sur—are nodes. They draw in-migrants from neighboring provinces on Mindanao and from the Visayas. In-migration to the coastal lowlands of Lanao del Norte has been encouraged by the Maria Christina Falls hydroelectric industrial project and the new settlement areas in the west. Cotabato is the node of two overlapping regions. Region 6 reveals that Cotabato, in particular, has attracted substantial numbers of settlers from northwestern Luzon. Mi-

grants within northern Luzon go to Cagayan and Isabela.

Iloilo is the node of the in-migration region formed by the four provinces of the Island of Panay. Iloilo City, from which sugar is exported, is the commercial center of Panay. Rural-urban migration may, thus, help to explain the existence of this in-migration region as well as that of Region 4. Its node is Camarines Sur. The capital of this province, Naga, is the commercial and political nucleus of the Bicol peninsula. The major urban area of Negros Occidental—the node of Region 13—is Bacolod City, the Philippine sugar capital.

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TABLE 1. PHILIPPINES OUT-MIGRATION NODAL REGIONS

Nodal Regions	Out-Migration from Region (M_r)	Out-Migration from Node (M_n)	M_r/M_n
1. Antique*, Cotabato	68,872	70,842	.9722
2. Batangas*, Oriental Mindoro	110,537	123,748	.8932
3. Agusan, Bohol*, Bukidnon, Cotabato, Davao, Lanao del Norte, Lanao del Sur, Misamis Occidental, Misamis Oriental, Surigao, Zamboanga del Norte, Zamboanga del Sur	80,953	206,757	.3915
4. Capiz*, Cotabato	78,884	127,404	.6192
5. Agusan, Bohol, Bukidnon, Cebu*, Cotabato, Davao, Lanao del Norte, Lanao del Sur, Masbate, Misamis Occidental, Misamis Oriental, Negros Occidental, Negros Oriental, Palawan, Rizal, Sulu, Surigao, Zamboanga del Norte, Zamboanga del Sur	170,178	514,229	.3309
6. Agusan, Bukidnon, Cotabato, Davao, Iloilo*, Lanao del Norte, Lanao del Sur, Misamis Occidental, Misamis Oriental, Negros Occidental, Negros Oriental, Palawan, Rizal, Sulu, Surigao, Zamboanga del Norte, Zamboanga del Sur	156,768	229,257	.6838
7. Agusan, Bukidnon, Cotabato, Davao, Lanao del Norte, Lanao del Sur, Leyte*, Misamis Occidental, Misamis Oriental, Rizal, Surigao, Zamboanga del Norte, Zamboanga del Sur	159,019	243,443	.6582

TABLE 1.   (Continued) PHILIPPINES OUT-MIGRATION   NODAL REGIONS

Nodal Regions	Out-Migration from Region (M_r)	Out-Migration from Node (M_n)	M_r/M_n
8. Manila*, Palawan, Rizal	129,009	315,067	.4095
9. Lanao del Norte, Misamis Occidental*, Zamboanga del Norte, Zamboanga del Sur	45,961	185,577	.2477
10. Bukidnon, Misamis Oriental*	37,384	57,872	.6460
11. Agusan, Bukidnon, Cotabato, Davao, Lanao del Norte, Negros Occidental*, Zamboanga del Norte, Zamboanga del Sur	118,116	135,182	.8738
12. Agusan, Bukidnon, Cotabato, Davao, Lanao del Norte, Lanao del Sur, Misamis Occidental, Misamis Oriental, Negros Oriental*, Zamboanga del Norte, Zamboanga del Sur	80,468	104,160	.7725
13. Isabela, Nueva Ecija*, Nueva Viscaya	109,159	116,609	.9361
14. Cotabato, Isabela, Mountain Province, Nueva Vizcaya, Occidental Mindoro, Palawan, Pangasinan*, Rizal	197,753	235,699	.8390
15. Oriental Mindoro, Romblon*	25,427	31,011	.8199
16. Agusan, Surigao*	28,171	33,042	.8526

* Node

TABLE 2. PHILIPPINES IN-MIGRATION NODAL REGIONS

Nodal Regions	In-Migration from Region (M_r)	In-Migration from Node (M_n)	M_r/M_n
1. Agusan*, Aklan, Antique, Batanes, Bohol, Capiz, Cebu, Iloilo, Leyte, Masbaste, Misamis Oriental, Negros Occidental, Negros Oriental, Romblon, Samar, Surigao	86,559	110,555	.7829
2. Batanes, Bukidnon*	86,533	86,662	.9985
3. Abra, Cagayan*, Ilocos Norte, Ilocos Sur	25,823	30,239	.8540
4. Albay, Camarines Sur*, Catanduanes, Sorsogon	47,047	85,432	.5507
5. Bohol, Cebu*, Leyte, Samar	55,516	59,456	.9337
6. Abra, Aklan, Antique, Batanes, Bohol, Capiz, Cebu, Cotabato*, Ilocos Norte, Ilocos Sur, Iloilo, La Union, Negros Occidental, Negros Oriental, Pangasinan	178,002	375,748	.4737
7. Aklan, Antique, Batanes, Bohol, Capiz, Cebu, Cotabato*, Iloilo, Leyte, Masbate, Negros Occidental, Negros Oriental, Romblon, Samar	158,016	375.748	.4205
8. Aklan, Antique, Batanes, Bohol, Capiz, Cebu, Davao*, Iloilo, Leyte, Masbate, Misamis Occidental, Negros Occidental, Negros Oriental, Romblon, Samar, Sulu, Surigao	123,164	366,575	.3360
9. Aklan, Antique, Capiz, Iloilo*	24,513	29,860	.8209

TABLE 2. (Continued) PHILIPPINES IN-MIGRATION NODAL REGIONS

Nodal Regions	In-Migration from Region (M_r)	In-Migration from Node (M_n)	M_r/M_n
10. Abra, Batanes, Cagayan, Ilocos Norte, Ilocos Sur, Isabela*, La Union, Mountain Province, Nueva Ecija, Nueva Vizcaya, Pangasinan, Tarlac	85.144	110,089	.7734
11. Aklan, Antique, Batanes, Bohol, Capiz, Cebu, Iloilo, Lanao del Norte*, Lanao del Sur, Leyte, Misamis Occidental, Negros Occidental, Negros Oriental, Samar	85,643	112,915	.7585
12. Batanes, Lanao del Sur*	16,009	16,145	.9916
13. Aklan, Antique, Batanes, Bohol, Capiz, Cebu, Iloilo, Leyte, Negros Occidental*, Negros Oriental, Samar	63,588	118,774	.5354
14. Batanes, Negros Oriental*	142,770	143,808	.9928
15. Batangas, Marinduque, Oriental Mindoro*, Romblon	43,516	73,941	.5885
16. Albay, Batangas, Camarines Norte, Camarines Sur, Catanduanes, Marinduque, Quezon*, Sorsogon	92,237	109,613	.8415
17. Batanes, Tarlac*	32,445	33,661	.9639
18. Aklan, Antique, Batangas, Bohol, Capiz, Cebu, Iloilo, Lanao del Norte, Lanao del Sur, Leyte, Masbate, Misamis Occidental, Misamis Oriental, Negros Occidental, Negros Oriental, Romblon, Samar, Sulu, Zamboanga del Norte, Zamboanga del Sur*	98,992	359,075	.2757

* Node