

TABLE Nº 2: BIRDS (continued)

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
PASSERIFORMS	TIRANIDEÆ	Tyrannus	<i>T. melancholicos</i>	186	Suiriri
		Fluvicola	<i>F. nengeta</i>	187	Lavanderia-mascarada
		Myiarchos	<i>M. ferx</i>	188	Maria-cavaleira
			<i>M. swainsoni</i>	189	Irrê
		Euscharthmus	<i>E. meloryphus</i>	190	Barulhento
		Tolmomyias	<i>T. sulphurescens</i>	191	Bico-chato
		Elaenia	<i>E. chiriquensis</i>	192	Tução
		Suiriri	<i>S. affinis</i>	193	Suiriri cinzento
	Phaeomyias	<i>P. murina</i>	194	Bagageiro	
	HIRUNDINIDEÆ	Progne	<i>P. chalybea</i>	195	Andorinha
	CORVIDEÆ	Cyanocorax	<i>C. cristatellus</i>	196	Pega
			<i>C. Cyanopogon</i>	197	Cancã
	TROGLODITIDEÆ	Troglodytes	<i>T. aedon</i>	198	Cambaxirra
			<i>T. leucotis</i>	199	Beira-rio
			<i>T. longirostris</i>	200	Garrinchão
	MIMIDEÆ	Mimus	<i>M. saturninus</i>	201	Arrebita-rabo
	TURDIDEÆ	Turdus	<i>T. leucomelas</i>	202	Sabiá-branco
	SILVIIDEÆ	Polioptila	<i>P. plumbea</i>	203	Balança-rabo
	VIREONIDEÆ	Vireo	<i>V. chivi</i>	204	Juruviara
	TRAUPIDEÆ	Euphonia	<i>E. chlorotica</i>	205	Fift or Vivi
			<i>C. cyprina</i>	206	Bandoleta
			<i>N. fasciata</i>	207	Maria-tiró
			<i>R. carbo</i>	208	Pipira-vermelho
			<i>T. cayana</i>	209	Saira-amarelo
	PARULIDEÆ	Parula	<i>P. pitiayumi</i>	210	Mariquita
	ICTERIDEÆ	Cacicus	<i>C. cela</i>	211	Xexéu
			<i>M. bonariensis</i>	212	Gaudério, Chopin
CEREBIDEÆ	Conirostrum	<i>C. bicolor</i>	213	Sebinho-do-mangue	
FRINGILIDEÆ	Arremon	<i>A. taciturnus</i>	214	Tico-tico-bico-preto	
		<i>C. magellanicus</i>	215	Pintassilgo	
		<i>C. eucosma</i>	216	Mineirinho	
		<i>O. angolensis</i>	217	Curio, Avinhado	
		<i>P. dominicana</i>	218	Galo-da-campina	
		Saltator	<i>S. maximus</i>	219	Tempera-viola
			<i>S. atricollis</i>	220	Batuqueiro
		Sporophila	<i>S. albogularis</i>	221	Golinho, Brejal
Zonotrichia	<i>Z. capensis</i>	222	Tico-tico		

TABLE Nº 3: REPTILES

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
CHELONIAN	CHELONIDEÆ	Chelonia	<i>C. mydas</i>	223	Tartaruga-lisa *E
		Eretmochelys	<i>E. imbricata</i>	224	Tartaruga-de-pente *
		Caretta	<i>C. caretta</i>	225	Tartaruga-gigante *E
	EMIDIDEÆ	Pseudemys	<i>P. d'orbignyi</i>	226	Tigre-d'água
	CHELIDEÆ	Phrynops	<i>P. geoffroanus</i>	227	Cágado-do-rio
<i>P. tuberculatus</i>			228	Cágado-do-rio	
CROCODILIAN	ALIGATORIDEÆ	Caiman	<i>C. crocodilus</i>	229	Jacaré
SCALED (LACERTILIAN)	GECONIDEÆ	Briba	<i>B. brasiliana</i>	230	Osga or Briba
		Hemidactylus	<i>H. agris</i>	231	Osga nativa
			<i>H. mabouia</i>	232	Osga-de-parede
		Phyllopezus	<i>P. pollicaris</i>	233	Osga-da-castinga
	ANGUIDEÆ	Diploglossus	<i>D. lessonae</i>	234	Briba
	TEIIDÆ	Ameiva	<i>A. ameiva</i>	235	Tejubina
		Micrablepharus	<i>M. maximiliani</i>	236	Calanguinho
	ANFISBENIDEÆ	Amphisbaena	<i>A. vermicularis</i>	237	Cobra-cega
	IGUANIDEÆ	Iguana	<i>I. Iguana</i>	238	Sinimbu
		Polychrus	<i>P. acutirostris</i>	239	Papavento-preguiça
		Tropidurus	<i>T. torquatus</i>	240	Labigó
		Platynotus	<i>P. semitaeniatus</i>	241	Lagartixa-de-lajes
		Hoplocercus	<i>H. Spinosa</i>	242	Cuviara
	SCALED (OPHIDIAN)	BOIDEÆ	Boa	<i>B. c. constrictor</i>	243
Epicrates			<i>E. cenchria assisi</i>	244	Salamanta
COLUBRIDEÆ		Spilotes	<i>S. pullatus</i>	245	Caninana
		Oxybelis	<i>O. aeneus</i>	245	Bicuda
		Thamnodynastes	<i>T. pallidus</i>	247	Cobra-espada
			<i>R. strigilis</i>	248	Cobra-espada
		Liophis	<i>L. mossoroensis</i>	249	Jararaquinha
		Lygophis	<i>L. lineatus</i>	250	Jararaquinha
		Mastigodryas	<i>M. boddaerti</i>	251	Jararacuçu-d'água
		Drymarchon	<i>D. corais</i>	252	Jararacão
		Dromicus	<i>D. poecilogyrus</i>	253	Rainha
			<i>D. viridis</i>	254	Cobra-verde
		Chironius	<i>C. carinatus</i>	255	Cobra-cipó
		Leptophis	<i>L. ahaetula</i>	256	Cobra-cipó
		Helicops	<i>H. leopardinus</i>	257	Cobra-d'água
		Waglerophis	<i>W. merremi</i>	258	Boipeva
		Philodryas	<i>P. offersii</i>	259	Cobra-verde
		Pxyrhops	<i>O. trigeminus</i>	260	Coral-falsa
		Pseudoboa	<i>P. nigra</i>	261	Cobra-preta
		Clelia	<i>C. occipitolutea</i>	262	Muçurana
ELAPIDEÆ		Micrurus	<i>M. ibiboboca</i>	263	Coral
VIPERIDEÆ		Bothrops	<i>B. erythromelas</i>	264	Jararaca
			<i>B. iglesiassi</i>	265	Jararaca
			<i>B. neuneueclii piahyensi</i>	266	Jararaca
		Crotalus	<i>C. durissus cascavella</i>	267	Cascavel

TABLE Nº 4: ANUROUS AMPHIBIANS

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
ANUROUS AMPHIBIANS	BUFONIDEÆ	Bufo	<i>B. granulatus</i>	268	Cururu-mirim
			<i>B. guttatus</i>	269	Cururu
			<i>B. paracnemis</i>	270	Cururu-grande
	HILIDEÆ	Hyla	<i>H. daucini</i>	271	Perereca
			<i>H. leocophyllata</i>	272	Perereca
			<i>H. fuscovaria</i>	273	Perereca
			<i>H. rubicundula</i>	274	Perereca
		Phyllomedusa	<i>P. sp</i>	275	Perereca-preguiça
	LEPTODACTILIDEÆ	Leptodactylus	<i>L. fuscus</i>	276	Assobiadeira
			<i>L. labyrinthicus</i>	277	Jia
			<i>L. macrosternum</i>	278	Rã-galinha
			<i>L. pustulatus</i>	279	Jia-pequena
		Pleurodema	<i>P. diplostris</i>	280	Ranzinha
		Pseudopaludicola	<i>P. falcipes</i>	281	Ranzinha
	CERATOPHRYDEÆ	Proceratophrys	<i>P. cristiceps</i>	282	Sapo-de-chifre

TABLE Nº 5: FRESH WATER FISHES (OSTEICITIES) OF THE PARNAÍBA RIVER AND TRIBUTARIES

Remark: * means most frequently encountered species

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
CIPRINIFORMS (CARACOIDS)	CLUPEIDAE	Ilisha	<i>I. castelneana</i>	283	Sardinhão
	ERITRINIDAE	Hoplias	<i>H. malabaricus</i> *	284	Traíra
		Hoplerithinus	<i>H. unilaeniatus</i>	285	Traíra-pixuna
	CURIMATIDAE	Curimatus	<i>C. cyprinoides</i>	286	Branquinha
			<i>C. elegans</i>	287	Saguiru
		Acuticurimata	<i>A. macrops</i>	288	Branquinha
	PROCHILODONTIDAE	Prochilodus	<i>P. lacustris</i> *	290	Curimatã
			<i>P. nigricans</i>	291	Curimatã
	ANOSTOMATIDAE	Leporinus	<i>L. friderici</i> *	292	Aracu-branco
		Schizodon	<i>S. fasciatus</i> *	293	Aracu-pintado
	CARACIDAE (TETRAGONOPTERINEAE)	Tetragonopterus	<i>T. argenteus</i>	294	Piaba
		Asyanax	<i>A. bimaculatus</i> *	295	Piaba
		Chreotochanes	<i>C. affinis</i>	296	Piaba
		Moenkhausia	<i>M. sanctae filomenae</i>	297	Piabinha
	CARACIDAE (SERRASALMINEAE)	Serrasalmus	<i>S. rhombeus</i> *	298	Pirambeba
		Pygocentrus	<i>P. piraya</i>	299	Piranha-preta
			<i>P. nattereri</i> *	300	Piranha-vermelha
		Poptela	<i>P. obcularis</i>	301	
	CARACIDAE (MILEINEAE)	Miloplus	<i>M. asterias</i>	302	Pacu
		Melynis	<i>M. lippincottianus</i>	303	Pacu
CARACIDAE (ACESTRORRINCHINEAE)	Acestrorhynchus	<i>A. falcatus</i>	304	Peixe-cachorro	
CARACIDAE (CARACINEAE)	Roeboides	<i>R. sp</i>	305	Pirã-tapioca	
HEMIODONTIDAE	Hemiodus	<i>H. parnaquae</i>	306	Voador	
GASTROPELECIDAE	Triportheus	<i>T. angulatus</i>	307	Sardinha-arauiri	
CIPRINIFORMS (GIMNOTOIDS)	GIMNOTIDAE	Gymnotus	<i>G. carapo</i>	308	Sarapó-cascavel
	RANFICTIIDAE	Rhamphichthys	<i>R. sp</i>	309	
		Sternopygus	<i>S. Macrurus</i> *	310	
SILURIFORMS	DORADIDAE	Platydoras	<i>P. costatus</i> *	311	Quiri-quiri
		Hassar	<i>H. affinis</i>	312	Mandi-bicucolo
	AUCHENIPTERIDAE	Auchenipterus	<i>A. nuchalis</i>	313	Peixe-gato
		Parauchenipterus	<i>P. sp</i>	314	Mandi-cumbá
		Pseudoauchenipterus	<i>P. sp</i>	315	Caratá
		Trachycoristes	<i>T. galeatus</i> *	316	Cangati
	PIMELODIDAE	Pimeloclus	<i>P. bronchii</i>	317	Mandi
			<i>P. maculatus</i>	318	Mandi
			<i>P. ornatus</i>	319	Mandi-guaru
		Pimelodella	<i>P. parnahybae</i>	320	Xué
			<i>P. steindachneri</i>	321	Xué
			Pseudoplatystoma	<i>P. fasciatum</i>	322
		Hemisorubim	<i>H. platyrhynchus</i>	323	Mandubé
		Brachyplatystoma	<i>B. filamentosum</i>	324	Piratinga
	AGENEIOSIDAE	Ageneiosus	<i>A. brevifiles</i>	325	Fidalgo-mandubi
			<i>A. valenciennesi</i>	326	Fidalgo
	CALICTIIDAE	Callichthys	<i>C. callichthys</i>	327	Tamboatã
	LORICARIIDAE	Loricaria	<i>L. sp</i>	328	Cari
		Loricariichthys	<i>L. tipus</i> *	329	Cari
Pterygoplichthys		<i>P. sp</i>	330	Boi-de-carro	
Hypostomus		<i>H. plecostomus</i>	331	Bodó	
SIMBRANCHIFORMS	SIMBRANCHIDAE	Synbranchus	<i>S. marmoratus</i>	342	Muçum

(continue next page)

TABLE Nº 5: FRESH WATER FISHES (OSTEICTIES) OF THE PARNAÍBA RIVER AND TRIBUTARIES (continued)

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
BELONIFORMS	BELONIDEÆ	<i>Strongylura</i>	<i>S. sp</i>	343	Agulha, Pira-pucu
PERCIFORMS	CICLIDEÆ	<i>Cichlasoma</i>	<i>C. sanctifranciscense</i>	344	Acará
		<i>Aequidens</i>	<i>A. vittatus</i>	345	Acará
		<i>Geophagus</i>	<i>G. surinamenses</i>	346	Acará
		<i>Crenicichla</i>	<i>C. lepidopa</i>	347	Peixe-sabão
	<i>Sarotherodon</i>	<i>S. niloticus</i>	348	Tilapia-do-nilo (+)	
	SOLEIDEÆ	<i>Achirus</i>	<i>A. sp</i>	349	Peixe-folha

(+) artificially introduced

TABLE Nº 6: FRESH WATER RAYS (BATOIDS)

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
BATOIDS	POTAMOTRIGONIDEÆ	<i>Potamotrygon</i>	<i>P. signata</i>	350	Arraia-d'água-doce

TABLE Nº 7: SEA FISH (OSTEICITIES)

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
ELOPIFORMS	ELOPIDEÆ	Elops	<i>E. saurus</i>	351	Ubarana
	MEGALOPIDEÆ	Megalops	<i>M. atlanticus</i>	352	Camurupim, Tarpão
	ALBULIDEÆ	Albula	<i>A. vulpes</i>	343	Tijubarana
CLUPEIFORMS	CLUPEIDEÆ	Opisthonema	<i>O. oglinum</i>	354	Sardinha-bandeira
		Sardinella	<i>S. aurita</i>	355	Sardinha-verdadeira
			<i>S. brasiliensis</i>	356	Sardinha-maromba
	ENGRAULIDEÆ	Odonthognathus	<i>O. micronatus</i>	357	Arenque-branco
		Cetengraulis	<i>C. edentulus</i>	358	Anchova
		Lycengraulis	<i>L. grossidens</i>	359	Anchova-rabo-amarelo
ANGULIFORMS	OFICTHIDEÆ	Ophichthys	<i>O. gomesi</i>	361	Muriungo
	MURENIDEÆ	Anarchias	<i>A. yoshiae</i>	362	Moréia
		Gymnothorax	<i>G. ocellatus</i>	363	Moréia-pintas-brancas
		Lycodontis	<i>L. moringa</i>	364	Moréia-pintas-negras
		Uropterygius	<i>U. diopus</i>	365	Moréia
SILURIFORMS	ARIDEÆ	Arius	<i>A. grandicassis</i>	366	Bagre-urutu
			<i>A. herzbergii</i>	367	Bagre-de-mangue
			<i>A. parkeri</i>	368	Bagre-gurijuba
		Bagre	<i>B. bagre</i>	369	Bagre-bandeira
			<i>B. marinus</i>	370	Bagre-bandeira
		Genidens	<i>G. genidens</i>	371	Bagre-curiaçu
BATRACOIDI-FORMS	BATRACOIDEÆ	Batrachoides	<i>B. surinamensis</i>	372	Boca-de-sapo
		Amphichthys	<i>A. cryptocentrus</i>	373	Pacamão
BELONIFORMS	BELONIDEÆ	Strongylura	<i>S. marina</i>	374	Agulhão-verde
			<i>S. notata</i>	375	Agulhão-zambaia
			<i>S. timucu</i>	376	Agulhão-timuco
	HEMIRRANFIDEÆ	Hemirhamphus	<i>H. brasiliensis</i>	377	Agulha-preta
			<i>H. unifasciatus</i>	378	Agulha-branca
	EXOCETIDEÆ	Cypselurus	<i>C. melanurus</i>	379	Peixe-voador
			<i>Hirundichthys</i>	<i>H. affinis</i>	380
Paraexocortes			<i>P. brachypterus</i>	381	Peixe-voador
CIPRINODONTI-FORMS	ANABLEPIDEÆ	Anableps	<i>A. microlepis</i>	382	Tralhoto
BERICIFORMS	HOLOCENTRIDEÆ	Myripristis	<i>M. jacobus</i>	383	Mariquita-olhão
ESCORPENI-FORMS	ESCORPENIDEÆ	Scorpaena	<i>S. calcarata</i>	384	Mangangá
			<i>S. petricola</i>	385	Mangangá
DACTILOPTE-RIDORMES	DASTILOPTERIDEÆ	Dactylopterus	<i>D. volitans</i>	386	Voador-de-pedra
PERCIFORMS (PERCOIDES)	POMACANTIDEÆ	Pomacanthus	<i>P. arcuatus</i>	387	Paru-dourado
			<i>P. paru</i>	388	Paru-preto
		Holocanthus	<i>H. ciliaris</i>	389	Paru-amarelo
			<i>H. tricolor</i>	390	Paru-dourado
	SERRANIDEÆ	Alphester	<i>A. afer</i>	391	Garoupa-rajada
		Cephalopholis	<i>C. fulvus</i>	392	Piaruna
		Dermatolepis	<i>D. inermis</i>	393	Piranema
		Diplectrum	<i>D. radiale</i>	394	Mixole
		Mycteroperca	<i>M. bonaci</i>	395	Serigado
		Serranus	<i>S. dewegeri</i>	396	Serigado
		Promicrops	<i>P. itaiara</i>	397	Mero
		Epinephelus	<i>E. morio</i>	398	Garoupa-são-tomé
		Paranthias	<i>P. furcifer</i>	399	Pargo-mirim
		Trachinotus	<i>T. glaucus</i>	400	Palometa
	GRAMISTIDEÆ	Rypticus	<i>R. saponaceus</i>	401	Sabão
	ECHENEIDEÆ	Echeneis	<i>E. naucrates</i>	402	Piolho
			<i>R. remora</i>	403	Piolho-de-cação
	PRIACANTIDEÆ	Priacanthus	<i>P. arenatus</i>	404	Olho-de-boi

(continue next page)

TABLE Nº 7: SEA FISH (OSTEICTIES) (continued)

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
PERCIFORMS (PERCOIDES)	CARANGIDEÆ	Caranx	<i>C. chrysus</i>	405	Guarajuba-preta
			<i>C. hippos</i>	406	Xaréu
			<i>C. latus</i>	407	Araximbora
			<i>C. lugubris</i>	408	Xaréu
		Alectis	<i>A. ciliaris</i>	409	Galo-de-alto
		Chloroscombrus	<i>C. chrysurus</i>	410	Palombeta
		Decapterus	<i>D. macarelus</i>	411	Cavalinho-de-reis
		Hemicaranx	<i>H. amblyhynchus</i>	412	
		Elagate	<i>E. bipinnulatus</i>	413	Arabaiana
		Oligoplites	<i>O. saliens</i>	414	Solteira, Tibiro
	Selar	<i>S. crumenophthalmus</i>	415	Garapau	
	Selene	<i>S. setepinnis</i>	416	Galo	
	CORIFENIDEÆ	Coryphaena	<i>C. equisetis</i>	417	Dourado
			<i>C. hippurus</i>	418	Dourado
	GERREIDEÆ	Diapterus	<i>D. rhombeus</i>	419	Carapeba
			<i>E. eucinostomus</i>	420	Carapicu
			<i>E. eugerres</i>	421	Caratinga
	LOBOTIDEÆ	Lobotes	<i>L. surinamensis</i>	422	Sargo-de-beiço
	ESPARIDEÆ	Achosargus	<i>A. probatocephalus</i>	223	Sargo
			<i>A. rhomboidalis</i>	424	Sargo-amarelo
		Calamus	<i>C. calamus</i>	425	Peixe-pena
	MALACANTIDEÆ	Malacanthus	<i>M. plumieri</i>	426	Pirá-branco
	LUTJANIDEÆ	Lutjanus	<i>L. analis</i>	427	Cioba
			<i>L. apodus</i>	428	Caranha-mulata
			<i>L. buccanella</i>	429	Pargo-boca-negra
			<i>L. jocu</i>	430	Carapitanga
			<i>L. purpureus</i>	431	Pargo-vermelho
			<i>L. synagris</i>	432	Caranha
			<i>L. vivanus</i>	433	Olho-de-vidro
		Ocyurus	<i>O. chrysurus</i>	434	Guaiuba, Saúba
		Rhomboplites	<i>R. aurorubens</i>	435	Pargo-piranga
		CENTROPOMIDEÆ	Centropomus	<i>C. ensiferus</i>	436
	<i>C. parallelus</i>			437	Camurim-açu
	<i>C. undecimalis</i>			438	Robalo-branco
	CHIFOSIDEÆ	Kyphosus	<i>K. incisor</i>	439	Piarabanha-amarela
			<i>K. sectatrix</i>	440	Piarabanha-branca
	POMADASIDEÆ	Pomadasys	<i>P. corvinaeformis</i>	441	Coró-cabeça-roxa
		Anisotremus	<i>A. bicolor</i>	442	Pirazumbi
			<i>A. virginicus</i>	443	Salema
		Conodon	<i>C. nobilis</i>	444	Roncador-de-listas
		Genyatremus	<i>G. leteus</i>	445	Jurumim, Gulosa
			<i>H. aurolineatum</i>	446	Sapuruna-branca
		Haemulon	<i>H. parrai</i>	447	Cambuba
			<i>H. plumieri</i>	448	Corcoroca, Biquara
		<i>H. steindachneri</i>	449	Corcoroca-boca-larga	
	ESCIENIDEÆ	Cynoscion	<i>C. acoupa</i>	450	Pescada-cascuda
<i>C. jamaicensis</i>			451	Pescada-enchova	
<i>C. leiarchus</i>			452	Pescada-branca	
<i>C. microlepidopus</i>			453	Pescada-dentuça	
<i>C. virescens</i>			454	Pescada-cambuçu	
<i>I. parvipinnis</i>			455	Pescada-chata	
Larimus		<i>L. breviceps</i>	456	Boca-mole	
Lonchurus		<i>L. lanceolatus</i>	457	Pescada	
Macrodon		<i>M. ancylodon</i>	458	Pescada-rabo-de-fogo	
Menticirrhus		<i>M. americanus</i>	459	Papa-terra	
Micropogonias		<i>M. furnieri</i>	460	Cururuca	
	<i>M. undulatus</i>	461	Corvina-de-linha		

(continue next page)

TABLE Nº 7: SEA FISH (OSTEICTIES) (continued)

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY	
PERCIFORMS (PERCOIDES)	ESCIENIDEÆ	Nebris	<i>N. microps</i>	462	Pescada-banana	
		Ophioscion	<i>O. punctatissimus</i>	463	Pescada-pontuada	
		Paralonchurus	<i>P. brasiliensis</i>	464	Pargo-ferreiro	
		Pogonias	<i>P. cromis</i>	465	Corvina-negra	
		Stellifer	<i>S. stellifer</i>	466	Cabeçudo	
			<i>S. rastrifer</i>	467	Cangangá-preto	
			<i>U. coroides</i>	468	Corvina-riscada	
	EFIPIDEÆ	Chaetodipterus	<i>C. faber</i>	469	Enxada	
	POMACENTRIDEÆ	Abudefduf		<i>A. sexalis</i>	470	Saberé, Sargento
				<i>C. capistratus</i>	471	Borboleta
CHÆTODONTIDEÆ	Chaetodon		<i>C. ocellatus</i>	472	Bicudinha	
			<i>C. striatus</i>	473	Borboleta	
PERCIFORMS (MUGILOIDES)	MUGILIDEÆ	Mugil		<i>M. curema</i>	474	Parati, Tainha
				<i>M. incilis</i>	475	Tamaratana-açu
				<i>M. lisa</i>	474	Curimã, Tainha
				<i>M. trichodon</i>	477	Tainha-roliça
PERCIFORMS (ESPIRENIDS)	ESPIRENIDEÆ	Sphyraena		<i>S. barracuda</i>	478	Barracuda
				<i>S. guachancho</i>	479	Bicuda-branca
PERCIFORMS (LABROIDS)	LABRIDEÆ	Bodianus	<i>B. dubius</i>	480	Pargo-pinsel	
	ESCARIDEÆ	Cryptotomus		<i>C. roseus</i>	481	Bodião
				<i>S. viride</i>	482	Batata
PERCIFORMS (ESCOMBROIDS)	ESCOMBRIDEÆ	Acanthocybium	<i>A. solandri</i>	483	Cavala-esfinge	
		Scomberomus		<i>S. cavalla</i>	484	Cavala
				<i>S. maculatus</i>	485	Serra-pintado
				<i>G. alletteratus</i>	486	Bonito
		Thunnus		<i>T. albacares</i>	487	Atum
				<i>T. alalunga</i>	488	Albacora-branca
				<i>T. atlanticus</i>	489	Albacorinha
			<i>T. obesus</i>	490	Albacora	
	TRICHIURIDEÆ	Trichiurus	<i>T. lepturus</i>	491	Espada	
	XIFIIDEÆ	Xiphias	<i>X. gladius</i>	492	Espadarte	
	ISTIOPORIDEÆ	Tetrapterus		<i>T. albidus</i>	493	Agulhão-branco
			<i>M. nigricans</i>	494	Agulhão-azul	
PERCIFORMS (POLINEMIDS)	POLINEMIDEÆ	Polydactylus	<i>P. virginicus</i>	495	Barbudo	
TETRAODONTI- FORMS (BALISTIDS)	BALISTIDEÆ	Balistes	<i>B. vetula</i>	496	Cangulo-papo-amarelo	
		Melichthys	<i>M. piceus</i>	497	Cangulo-fernando	
	MONACANTIDEÆ	Alutera	<i>A. scriptus</i>	498	Gudunho	
		Cantherhines	<i>C. pullus</i>	499	Cangulo-de-pedra	
		Monacanthus	<i>M. hispidus</i>	500	Peixe-porco	
	OSTRACIDEÆ	Acanthostracion	<i>A. quadricornis</i>	501	Baiacu-chifrado	
		Lactophrys	<i>L. trigonus</i>	502	Peixe-cofre	
		Rhinesomus	<i>R. triqueter</i>	503	Peixe-cofre	
TETRAODONTI- FORMS (TETRAODON- TIDS)	TETRAODONTIDEÆ	Canthigaster	<i>C. rostratum</i>	504	Baiacu-olho-riscado	
		Lagocephalus	<i>L. laevidatus</i>	505	Baiacu-garajuba	
		Spheroides	<i>S. testudineus</i>	506	Baiacu-coroa	
		Colomesus	<i>C. psittacus</i>	507	Baiacu-listrado	
	DIODONTIDEÆ	Diodon	<i>D. hystrix</i>	508	Baiacu-graviola	
		Chylomycterus	<i>C. spinosus</i>	509	Baiacu-de-espinho	
PLEURONECTI- FORMS	SOLEIDEÆ	Achirus	<i>A. fasciatum</i>	510	Solha	
		Syacium	<i>S. papillosum</i>	511	Linguado-de-areia	
		Symphurus	<i>S. plagusia</i>	512	Lingus-de-mulata	

TABLE Nº 8: SEA SHARKS AND RAYS (CONDRICTIES, SELACHIOUS and BATOIDS)

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
SELACHIOUS CARCHARRINI- FORMS	CARCHARRINIDÆ	Carcharhinus	<i>C. acronotus</i>	513	Flamengo
			<i>C. leucas</i>	514	Cabeça-chata
			<i>C. limbatus</i>	515	Galha-preta
		Rhizoprionodon	<i>C. falciformes</i>	516	Focinhudo
			<i>C. perezii</i>	517	Fidalgo-azul
			<i>R. lalandi</i>	518	Rabo-seco
	ESFIRNIDÆ	Sphyrna	<i>R. porosus</i>	519	Rabo-seco
			<i>G. cuvieri</i>	520	Jaguara
			<i>S. lewini</i>	521	Paná
	TRIACHIDÆ	Mustelus	<i>S. media</i>	522	Rudela
	ESCILIORRINIDÆ	Scyliorhinus	<i>S. mokarran</i>	523	Martelo
			<i>S. tiburo</i>	524	Rudela, Paná
<i>S. tudes</i>			525	Rudela, Paná	
		<i>M. bigmani</i>	526	Canejo	
ORECICLOBIFORMS	GINGLIMOSTOMIDÆ	Ginglimostoma	<i>S. boa</i>	527	Cação-pinto
BATOIDS PRISTIFORMS	PRISTIDÆ	Pristis	<i>G. cirratum</i>	528	Lambaru, Lixa
BATOIDS TORPEDINIFORMS	NARCINIDÆ	Narcine	<i>P. pectinatus</i>	529	Peixe-serra
BATOIDES RAJIFORMS	RAJIDÆ	Raja	<i>N. brasiliensis</i>	530	Treme-treme
BATOIDES MILIOBATIFORMS	RINOBATIDÆ	Rhinobatus	<i>R. meta</i>	531	Raia-chita
			<i>R. percellens</i>	532	Raia-viola
	MILIOBATIDÆ	Aetobatus	<i>A. narinari</i>	533	Raia-pintada
	RINOPTERIDÆ	Rhinoptera	<i>R. bonasus</i>	534	Raia
	GIMNURIDÆ	Gymnura	<i>G. micrura</i>	535	Raia-borboleta
DASIATIDÆ	Dasyatis	<i>D. guttata</i>	536	Raia-lixá	
		<i>D. say</i>	537	Raia-amarela	

TABLE Nº 9: SEA CRUSTACEANS

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
DECAPODA MACRURAN PENEIDS	PENEIDEÆ	Penaeus	<i>P. subtilis</i>	538	Camarão-café
			<i>P. brasilienses</i>	539	Camarão-rosado
			<i>P. notialis</i>	540	Camarão-rosado
			<i>P. schmitti</i>	541	Camarão-branco
		Trachypenaeus	<i>T. constrictus</i>	542	Camarão-agarrador
			<i>T. similis</i>	543	Agarrador-amarelo
		Xiphopenaeus	<i>X. kroyeri</i>	544	Camarão-sete-barbas
		Sicyonia	<i>S. typica</i>	545	Camarão-da-pedra
			<i>S. laevigata</i>	546	Camarão-da-pedra
			<i>S. parri</i>	547	Camarão-da-pedra
SOLENCERIDEÆ	Pleoticus	<i>P. robustus</i>	548	Camarão-vermelho	
DECAPODA MACRURAN CARIDS	PALEMONIDEÆ	Palaemon	<i>P. northropi</i>	549	Camarão-das-pedras
			<i>P. pandaliformes</i>	550	Camarão-das-pedras
	Nemapalaemon	<i>N. schmitti</i>	551	Camarão-covaco	
HIPOLITIDEÆ	Exhippolysmata	<i>E. oplophoroides</i>	552	Camarão-chifrado	
DECAPODA PANULIRES	PALINURIDEÆ	Panulirus	<i>P. argus</i>	553	Lagosta-vermelha
			<i>P. laevicauda</i>	554	Lagosta-verde
	ESCLARIDEÆ	Scyllarides	<i>S. brasilienses</i>	555	Lagosta-japonesa
			<i>S. delfosi</i>	556	Lagosta-sapata
		Parribacus	<i>P. antarcticus</i>	557	Lagosta-chinesa
DECAPODA BRACHYURAN	GRAPSIDEÆ	Pachygrapsus	<i>P. gracilis</i>	558	Caranguejo-de-pedra
			<i>P. transversus</i>	559	Caranguejo-de-pedra
		Goniopsis	<i>G. cruentata</i>	560	Aratu-do-mangue
		Metasesarma	<i>M. rubripes</i>	561	Aratu-mirim
	OCIPODIDEÆ	Ocypode	<i>O. quadrata</i>	562	Maria-farinha
			<i>U. leptodactyla</i>	563	Xié, Chama-maré
		Uca	<i>U. mordax</i>	564	Xié, Chama-maré
			<i>U. maracoani</i>	565	Caranguejo-tesoura
			<i>U. cordatus</i>	566	Tesourão
	PORTUNIDEÆ	Callinectes	<i>C. bocourti</i>	567	Siri-açu
			<i>C. danae</i>	568	Siri-mirim
			<i>C. exasperatus</i>	569	Siri-açu
	XANTIDEÆ	Pilumnus	<i>P. caribaeus</i>	570	
Menippe		<i>M. modifrons</i>	571	Caranguejo-mão-grossa	

TABLE Nº 10: FRESH WATER CRUSTACEANS OF THE PARNAÍBA RIVER AND TRIBUTARIES

ORDER	FAMILY	GENUS	SPECIES	Nº	POPULAR TERMINOLOGY
DECAPODA MACRURAN CARIDS	PALEMONIDEÆ	Macrobrachium	<i>M. sp</i>	572	Camarão-sosso
	ATHIDEÆ	Atya	<i>A. scabra</i>	573	Camarão-curuca

A BRIEF GLOSSARY ON REGIONAL FAUNA

Translation of some names for animal designations are given in order to help understanding the tables. Note that the list shown below is quiet simple and do not intend to be a complete one.

Brazilian names	English	Brazilian names	English
Anchova	anchovy	Macaco	monkey
andorinha	swallow	marreco	teal, wild duck
arenque	herring	mero	jewfish
arraia	ray	morego	bat
atum	tuna	morego-de-frutas	"fruit" bat
Bagre	catfish	morego-hematófago	blood sucker bat
baiaçu	globefish	morego-incetivoro	incetivorous bat
beija-flor	hummingbird	morego-pescador	"fisher" bat
Cação	shark, dogfish	Onça	jaguar
cachorro	dog	Papagaio	parrot
cágado-do-rio	fresh water turtle	pato	duck
camarão	shrimp	peixe	fish
camarão-vermelho	red shrimp	peixe-espada	swordfish
caranguejo	crab	peixe-voador	flying fish
cascavel	rattlesnake	perdiz	partridge
cobra	snake	periquito	parraket
cobra d'água	water snake	pica-pau	woodpecker
cobra-cipó	"liane" snake	pintassilgo	goldfinch
cobra-verde	green snake	piranha	piranha
codorna	quail	pombo	pigeon
Galo	cock	Rã	frog
garça morena	brownish heron	raposa	fox
garça-branca-grande	big white heron	Sapo	toad
garça-branca-pequena	little white heron	sardinha	sardine
gavião	sparrow-hawk	Tamanduá	anteater
gralha	carion crow	tartaruga	tortoise
Jacaré	cayman	tartaruga gigante	giant tortoise
Lagartixa	gecko	tatu	armadillo
lagosta	lobster	Urubu	black vulture
lagosta-vermelha	red lobster	Veado	red deer
lontra	otter		

D. SOCIOECONOMIC ASPECTS

1. Census Information per homogeneous micro regions (MRH's)

STATE	Homogeneous micro regions	Population		
		Total	Urban	Rural
MARANHÃO	Baixo Parnaíba	101,144	25,243	75,901
	Caxias	331,819	199,129	132,690
	Chapada das Mangabeiras	56,984	17,936	39,048
	Chapada do Alto Itapecuru	172,051	67,288	104,763
	Chapadinha	166,209	91,944	104,265
	Codó	204,957	94,899	110,058
	Coelho Neto	74,144	40,683	30,461
	Gerais de Balsas	86,295	43,910	42,385
	Porto Franco	80,133	33,131	47,002
		Sub-total (A)	1,270,736	584,163
	State of Maranhão (B)	4,929,029	1,972,008	2,957,021
	(A) / (B) %	25,8 %	30,3 %	23,2 %
PIAUI	Alto Parnaíba	33,467	13,556	19,911
	Alto/médio Gurgueia	68,393	25,833	42,560
	Baixo Parnaíba	282,169	110,633	171,536
	Bertolínea	39,307	16,308	22,499
	Chapada do Extremo Sul	68,430	21,054	47,376
	Floriano	115,305	70,710	44,595
	Litoral Piauiense	246,025	144,274	101,751
	Médio Parnaíba	115,981	60,846	55,135
	Teresina	744,788	620,613	124,175
		Sub total (C)	1,713,865	1,084,327
	State of Piauí (total) (D)	2,581,215	1,386,213	1,214,997
	(C) / (D) %	66,4 %	79,4 %	51,8 %
TOTALS	Total (A + C)	2,984,601	1,668,430	1,316,111
	(A + C) / (B + D) %	39,7 %	50,0 %	31,5 %
	MA portion: A / (A + C) %	42,6 %	35,0 %	52,2 %
	PI portion: C / (A + C) %	57,4 %	65,0 %	47,8 %

Note that there are only small amounts of inhabitants in the State of Ceará portion of the Basin thence not being presented here due to negligible values.

2. Existing studies, plans and projects

In the following items, there are some few comments about studies, plans and projects that are important to the context of the navigational plan.

2.1. Studies by SUDENE

Between the years of 1966 and 1981, SUDENE developed the "*Plano de Aproveitamento Integrado dos Recursos Hídricos do Nordeste do Brasil*" (PLIRHINE), which consisted of integrated studies for the Northeastern Brazil water resources management and usage plan. These studies involved specific researches and field works on natural resources, diagnosis in regional basis, prospective scenarios and evaluation of the potentialities and availability of surface and ground water resources.

PLIRHINE scope of work was not completed due to lack of financial support and political interest. Program was divided in phases, but only the first one was developed. Schedule of planning was fixed as follows:

PHASE I:

Definition of necessary elements for a Northeastern water policy with Hydrologically Homogenous Zones and great and mean watersheds, including management of water resources allocation in correlation to water availability, present and predictable uses. This must be based on previously established criteria, in order to allow for mean and long range planning. Strategies and directives for a water resources management policy, considering legal, political and institutional aspects. Sector planning and programming for specific areas



PHASE II:

Reconnaissance studies, in accordance to strategies and directives of the above mentioned policy. In this phase, water demands and water resources availability will be examined in more detail. Then, an array of subprograms and specific projects based on economic and social indicators will be established.



PHASE III:

Project detailing on feasibility level, with implantation and investments schedules prepared for the region water needs.

Works done established that the Northeast should be divided in 24 regions for planning purposes, with 56 sub-regions or planning units. Each one presented different sizes, which were inversely correlated to the percentages of water demands in relation to availability and hence the unit areas were compatible to the required water balance precision.

Nevertheless, various programs and proposals for water resources management resulted from PLIRHINE Phase I, including damming works in the Parnaíba and Balsas rivers for power supply and navigation purposes

PLIRHINE planning units that include the Parnaíba River Basin territory was designated as the UP-06 unit or Parnaíba unit, with a total area of 330.000 km², from which 61.000 km² remain in the Maranhão State

2.2. Studies by SAGRIMA¹⁷

SAGRIMA studied during the years of 1991 and 1992 the water demands and availability of water resources for the whole State of Maranhão in order to grant information a global damming program. From these studies, it can be evaluated the demands for water reservation in the western side of Parnaíba River Basin, for water supply purposes in the rural areas:

MUNICIPALITY	Dams*
Alto Parnaíba	51
Arai	20
Balsas	51
Barão de Grajaú	69
Benedito Leite	51
Brejo	20
Buriti	20
Coelho Neto	20
Duque de Bacelar	51
Fortaleza dos Nogueiras	51
Loreto	51
Magalhães de Almeida	20
Matões	20
Nova Iorque	51
Parnarama	20
Sambaíba	50
Santa Quitéria	20
São Bernardo	20
São Felipe de Balsas	51
São Francisco do Maranhão	20
São João dos Patos	77
São Raimundo das Mangabeiras	51
Timon	20
TOTAL	926

* Quantity of required small dams, as shown by inventory.

Another branch of the SAGRIMA studies shows the identification of potential irrigable lands for the whole territory of Maranhão. From these, the Parnaíba River Basin presents the following (see next page):

¹⁷ *Secretaria de Estado de Agricultura do Maranhão* (Maranhão State Secretary of Agriculture)

2.3. Potential irrigable lands in Maranhão inside Parnaíba River Basin boundaries

SITE	SURFAC E (ha)	MUNICIPALITIES
Brejo	2,000	Brejo
Canto dos Currais I	2,400	Fortaleza dos Nogueiras
Canto dos Currais II	7,600	Fortaleza dos Nogueiras
Caxias	3,500	Caxias
Coelho Neto	1,600	Coelho Neto
Duque Bacelar	4,000	Duque Bacelar
Gameleira	2,000	Sambaíba
Magalhães de Almeida	3,500	Magalhães de Almeida
Maravilha	2,000	Balsas
Paciência	1,000	Balsas
Parnarama	13,000	Parnarama
Santa Quitéria	2,500	Santa Quitéria
Vale do Rio Balsas	53,525	Loreto e Balsas
TOTAL DE ÁREAS	98,625	-

Source: SAGRIMA

2.4. Navigation projects for the Parnaíba River

Studies made by SUDENE in 1980 indicated that navigation in the Northeastern rivers should be promoted as sub product of power generation projects. Any damming project should be planned in order to consider viable ways of transposition from upstream to downstream and vice-versa.

Suggestions were made in order to canalize Parnaíba River between Boa Esperança Dam and Longá River, as well as stretches upstream Boa Esperança Reservoir up to Santa Filomena and Balsas River, but always subordinated to a multipurpose projects policy. Works in the Luís Correa Port were also suggested.

Multipurpose projects (with navigation locks) mentioned in the SUDENE study are listed below:

Dam site	Distance from mouth (km)	Nearest city
Araçá Falls	472	Floriano
Uruçuí Preto	840	Loreto
Station 900 km	900	Loreto
Station 976 km	976	-
Station 1,042 km	1,042	-
Station 1,120	1,120	Alto Parnaíba

2.5. Public irrigation perimeters in Parnaíba River Basin, Piauí State portion

Project Name	Site	Present situation	Area (hectares)			Water from	Users	Crops
			Total	Irrigable	Irrigated			
Lagoas do Piauí	Luzilândia	Operational (only partially) since 1976	6,311	2,335	2,100	Cajueiro lagoon and Parnaíba River	150 families	cotton, beans, watermelon
Caldeiros	Periperi	Operational since 1972	1,200	450	388	Dam	100 families	rice, beans, maize, watermelon, banana, citrus
Piracuruca	Piracuruca	Under implantation	8,000	2,122		Piracuruca dam under construction		
Gurgueia	Cristino Castro and Eliseu Martins	Operational (since 1977)	12,886	2,252	1,899	Gurgueia River and artesian wells	190 families	Beans, watermelon, melon, banana, citrus
Vale do Fidalgo	Simplicio Mendes	Operational (since 1973)	5,444	470	308	water table	75 families	banana and beans
Tabuleiros Litorâneos	Parnaíba and Buriti dos Lopes	Under implantation	10,000					various
Tabuleiros de São Bernardo	Araioses and Magalhães de Almeida	Under implantation	17,372	4,977				

2.6. Projects presently being planned

PARNAÍBA PROGRAM AREA:

Várzea Grande
Cajazeiras de Baixo

TERESINA

Campo Largo
Campo do Forno
Centro Hortigranjeiro
Fazenda Zoares
Campestre

CAMPO MAIOR PROGRAM AREA

Projeto Santo Antônio

FLORIANO

Projeto Itauciras (PAPP)

E. LIST OF NAMES

- AGESPISA - Águas e Esgotos do Piauí S.A.
- AHINOR - Administração das Hidrovias do Nordeste
- CEPRO - Fundação Centro de Pesquisas Econômicas e Sociais do Piauí
- CHESF - Cia. Hidroelétrica do São Francisco:
- CNPq - Conselho Nacional de Pesquisas
- CONDEPI - Cia. de Desenvolvimento do Piauí.
- DER/PI - Departamento de Estradas de Rodagem do Estado do Piauí
- DESERT - Núcleo de Pesquisa e Controle da Desertificação no Nordeste
- DMA - Departamento de Meio Ambiente (Fundação CEPRO)
- DNOCS - Departamento Nacional de Obras contra as Secas
- ELETROBRAS - Centrais Elétricas do Brasil S.A.
- ELETRONORTE - Centrais Elétricas do Norte do Brasil S.A.
- EMBRAPA - Empresa Brasileira de Pesquisas Agropecuárias
- FUFPI - Fundação Universidade Federal do Piauí
- FUFPI - Fundação Universidade Federal do Piauí:
- Fundação IBGE - Fundação Instituto Brasileiro de Geografia e Estatística
- IBILCE - Instituto de Biociências, Letras e Ciências Exatas da UNESP
- JICA - Japan International Cooperation Agency
- MRHs - Microrregiões Homogêneas (homogeneous micro regions)
- OCTA- OCTA Consultoria e Planejamento S/C Ltda.
- PAPP - Programa de Apoio ao Pequeno Produtor Rural
- PCI - Pacific Consultants International
- PDRI - Plano de Desenvolvimento Regional Integrado (Regional integrated development plan)
- Projeto RADAM - Projeto Radar da Amazônia, lately changed to RADAMBRASIL
- SEAAB-PI - Secretaria de Agricultura, Abastecimento e Recursos Hídricos do Estado do Piauí:
- SENIR - Secretaria Nacional de Irrigação
- SEPLAN - Secretaria de Planejamento do Estado do Piauí
- SINFRRA - Secretaria de Estado da Infra-estrutura do Maranhão
- SMA - Secretaria do Meio Ambiente do Estado de São Paulo
- SUDENE - Superintendência de Desenvolvimento do Nordeste
- SUDEX - Superintendência de Desenvolvimento do Extremo Sul.
- UNESP - Universidade Estadual Paulista
- USP - Universidade de São Paulo.

F. PHOTOGRAPHIC DOCUMENTATION

Various photographs are shown in the next pages. They were shot during field trip survey and are presented in the report for pointing out some relevant aspects of the environment, in order to illustrate and add information to the various aspects discussed in Chapters 5 and 6. It may be noted also various aspects of the regional landscape pointed out in Chapter 4 that are correlated to erosion processes, which can affect the future waterway.

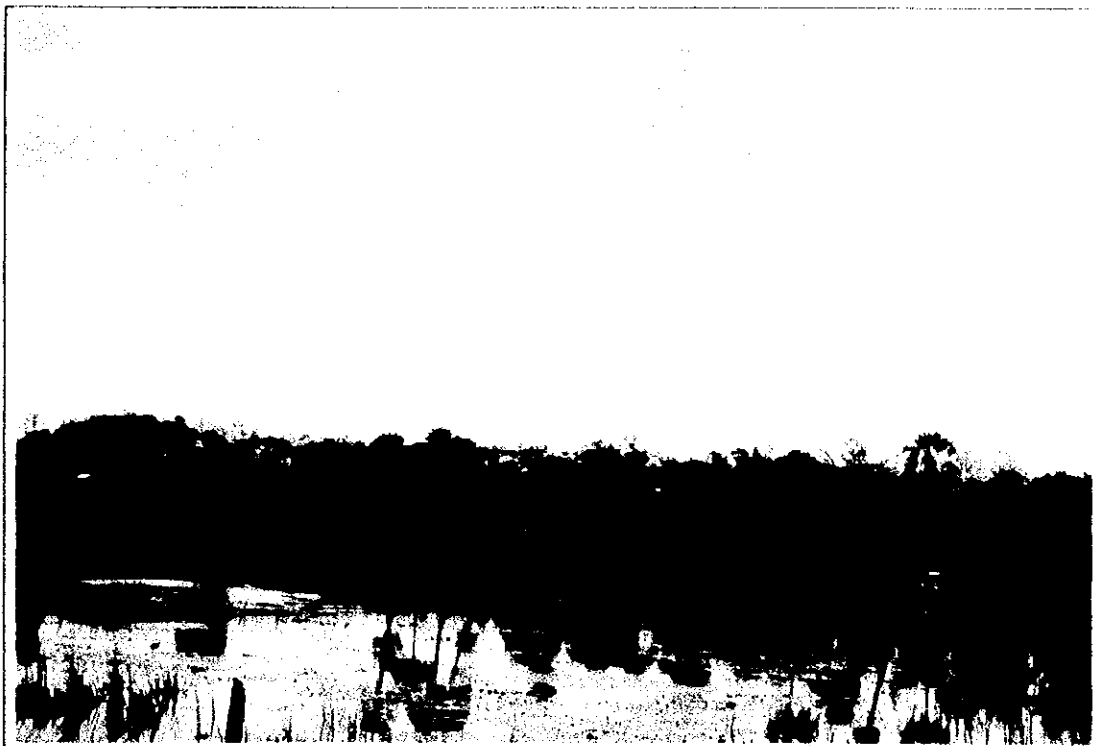


PHOTO 1 - Residual lake at Lower Parnaíba River near Joaquim Pires: important fish reproduction and spawning place. Mixed decidual forest surrounds the area, situated in a transition zone: contacts among forest, savanna and steppe.

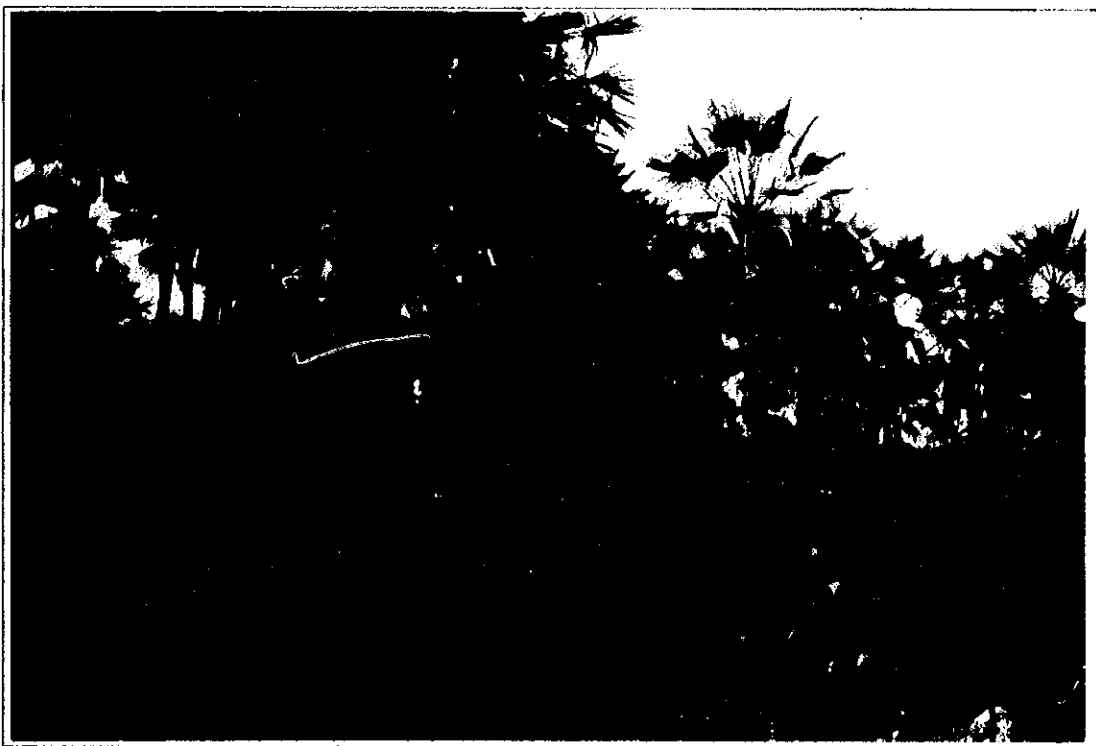


PHOTO 2 - Carnaúba (*Orbignya Martiana*) woods near Porto. Leaves of this palm trees are used in wax production.

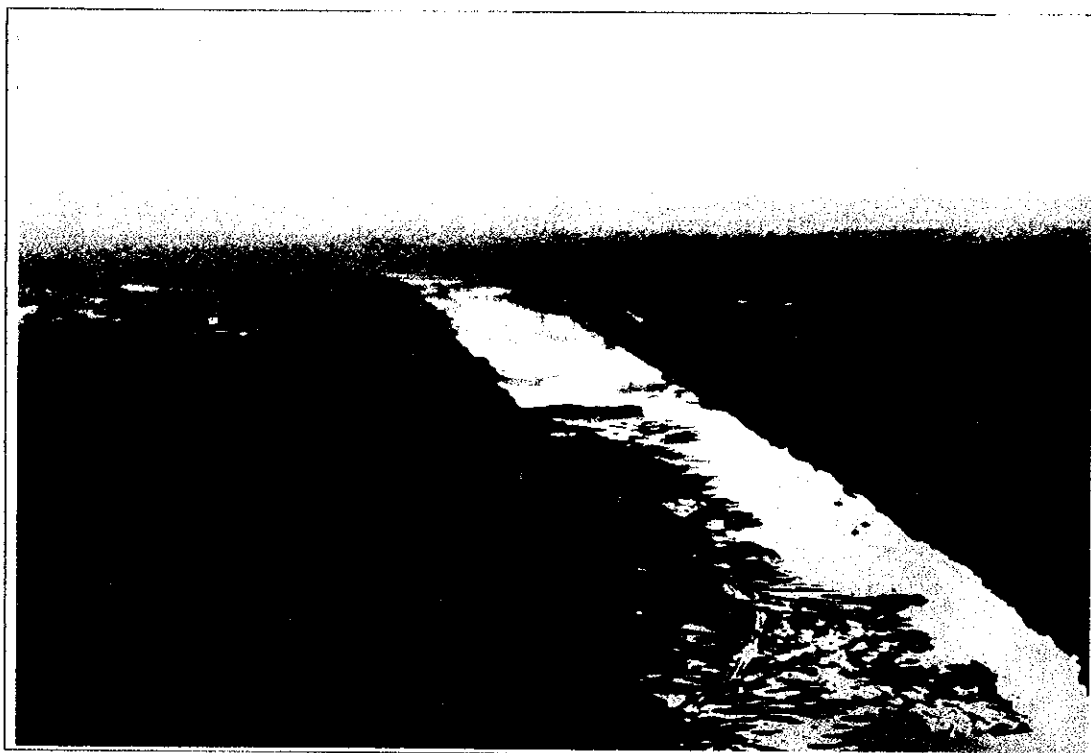


PHOTO 3 - Excavation in the Poti River bed near Teresina for. Sand is used in civil construction. The Poti River Basin has extensive areas of quartzous sand soil, which responds for significant sedimentation of the Parnaíba River bed.



PHOTO 4 - Burnt lowlands being prepared for agricultural use, a common practice. *Região de Cocais* with babassupalm trees (*Copernicia pruriifera*) and *carnaúba* near Palmeirais

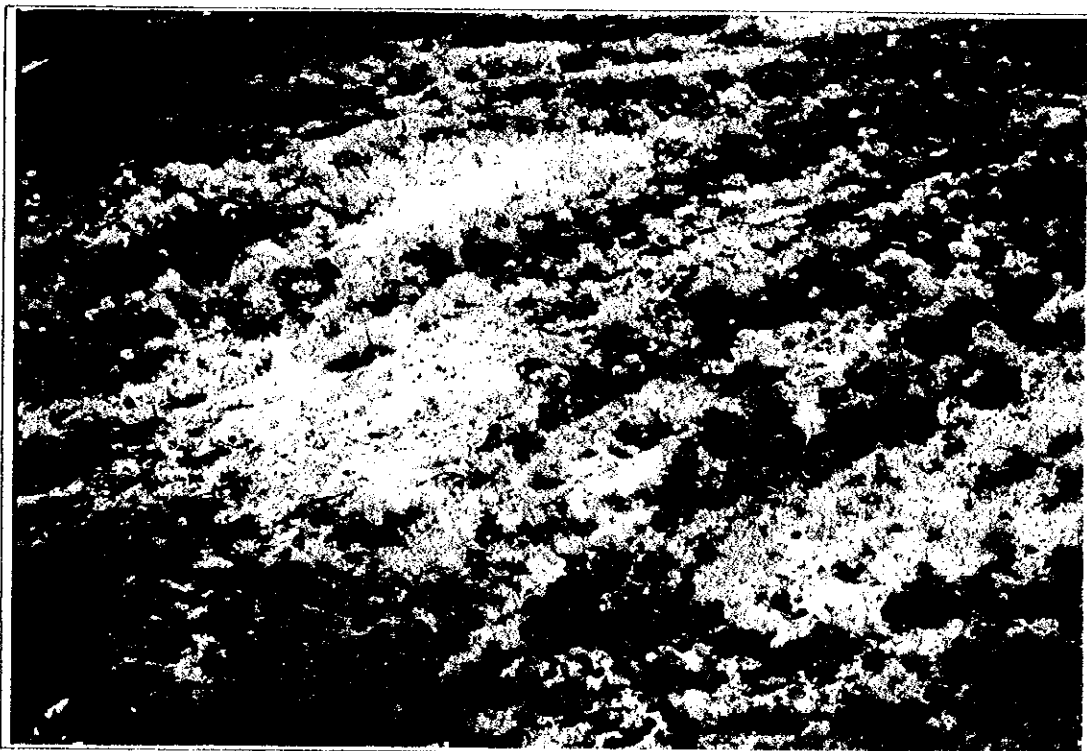


PHOTO 5 - Transition zone between steppe and savanna, near Floriano, with erosion processes under natural conditions. Note the poor soil protection due to the sparse vegetation.



PHOTO 6 - Remaining elevation in sedimentary rock terrain near Floriano, with sparse savanna vegetation on the steep slopes.

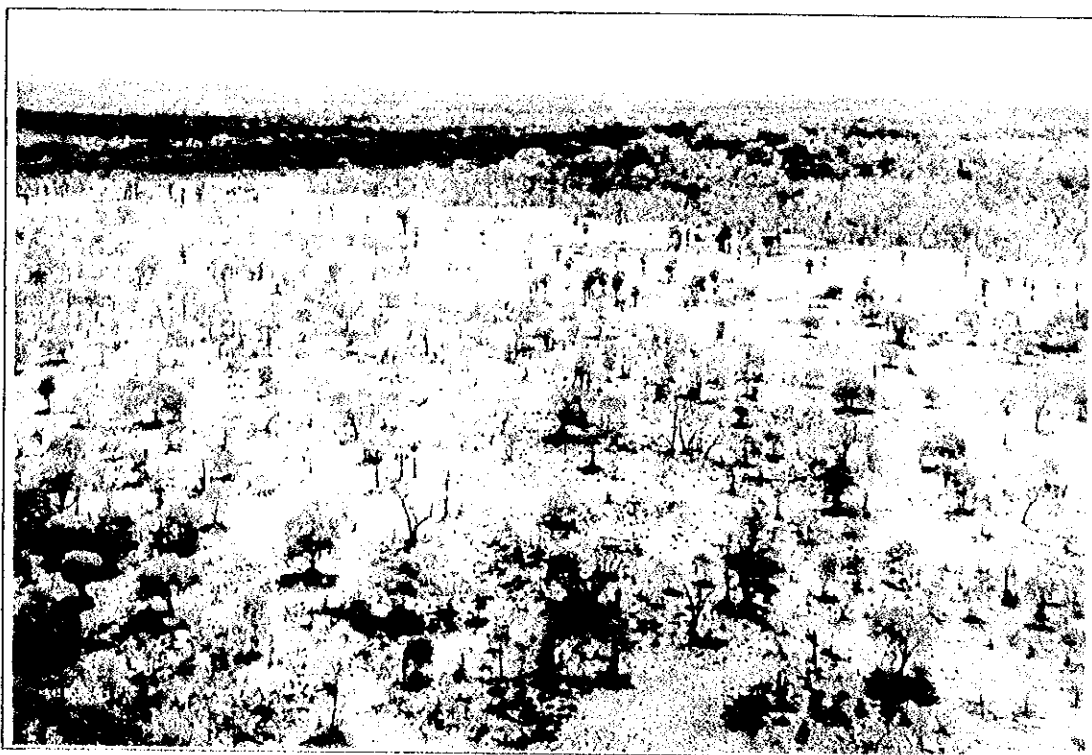


PHOTO 7 - Unprotected sandy soil near Floriano, subject to rain and wind erosion, due to deforestation. The remaining vegetation is representative of Seasonal Semidecidual Forest.



PHOTO 8 - *Boa Esperança Reservoir* with remaining testimonies of Seasonal Semidecidual Forest. Deforested areas along shoreline are being prepared for plantation, inside *Platôs de Guadalupe* irrigation project area.



PHOTO 9 - Babassupalm trees woods along Boa Esperança shoreline. Remaining trunks of original submerged vegetation can be seen. Some portions of the lake, although insignificant ones, are subject to eutrophication.



PHOTO 10 - *Buriti (Mauritia vinifera)* woods along streams near Boa Esperança Reservoir, another example of Seasonal Forest area.

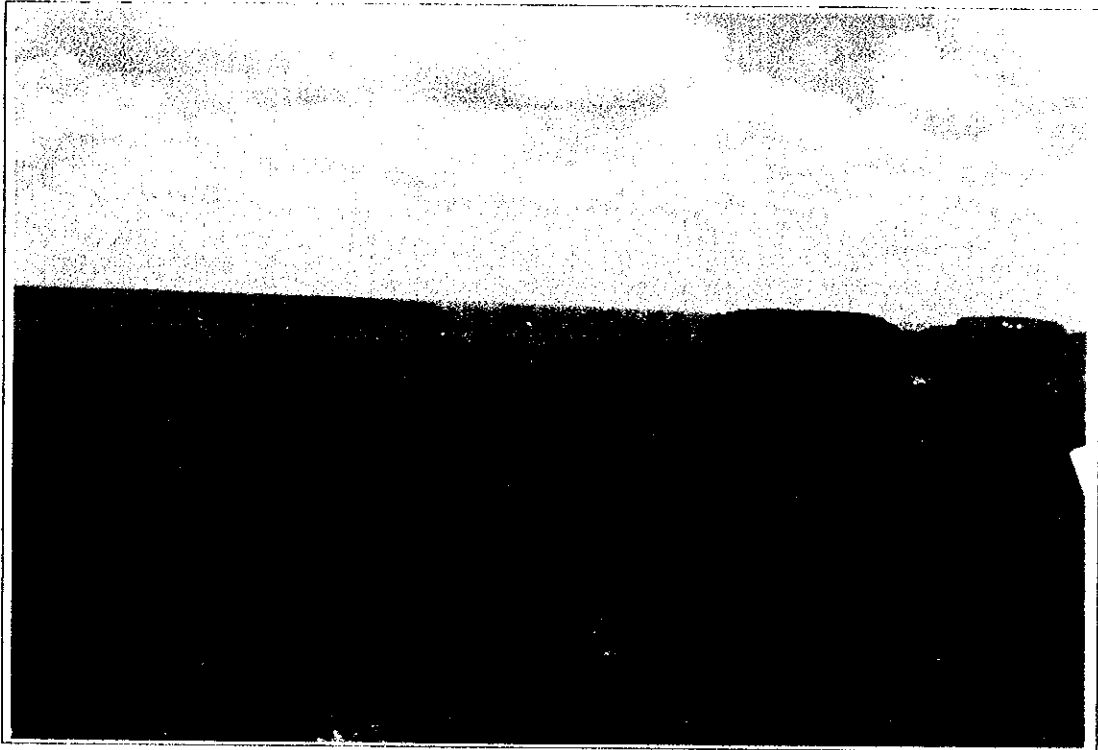


PHOTO 11 - Typical savanna landscape with riparian forests along streams. Note the residual elevations in sedimentary terrain and the steep slopes of Southwestern Piauí, corresponding to upper Parnaíba and upper Gurguéia rivers.



PHOTO 12 - Parnaíba River between Ribeiro Gonçalves and Santa Filomena. Temporary brownish color of the water is due to sediment transport after heavy rainfalls in the watershed. This area lies in the savanna "dominion", with quartzous sand soils. Note intense erosion processes along steep slopes and mountain borders.

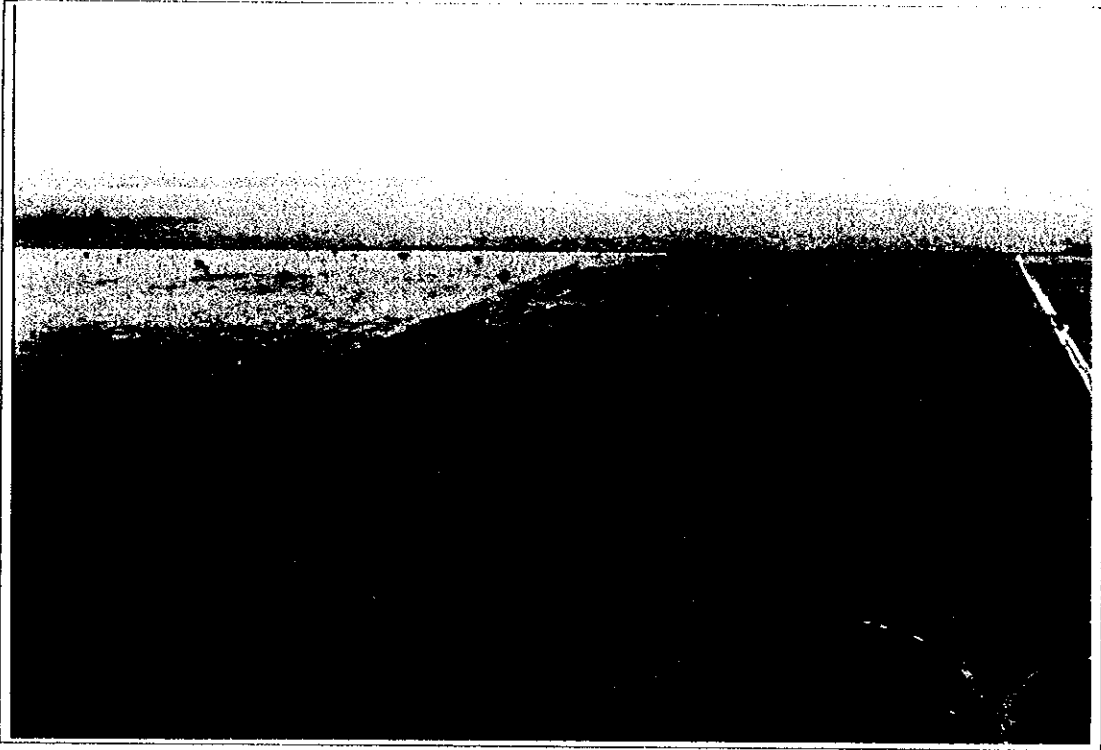


PHOTO 13 - Burnt flatland in the savanna, just prepared for cultivation in Southwestern Piauí.

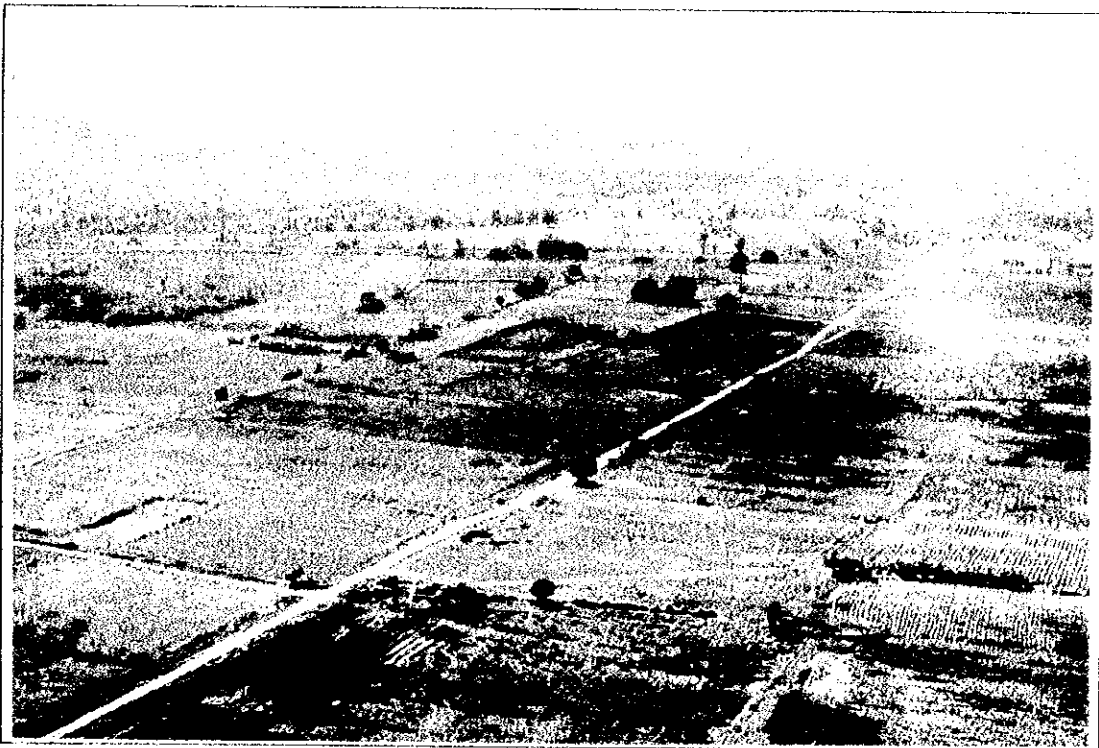


PHOTO 14 - Rice crops near Palmeirais.

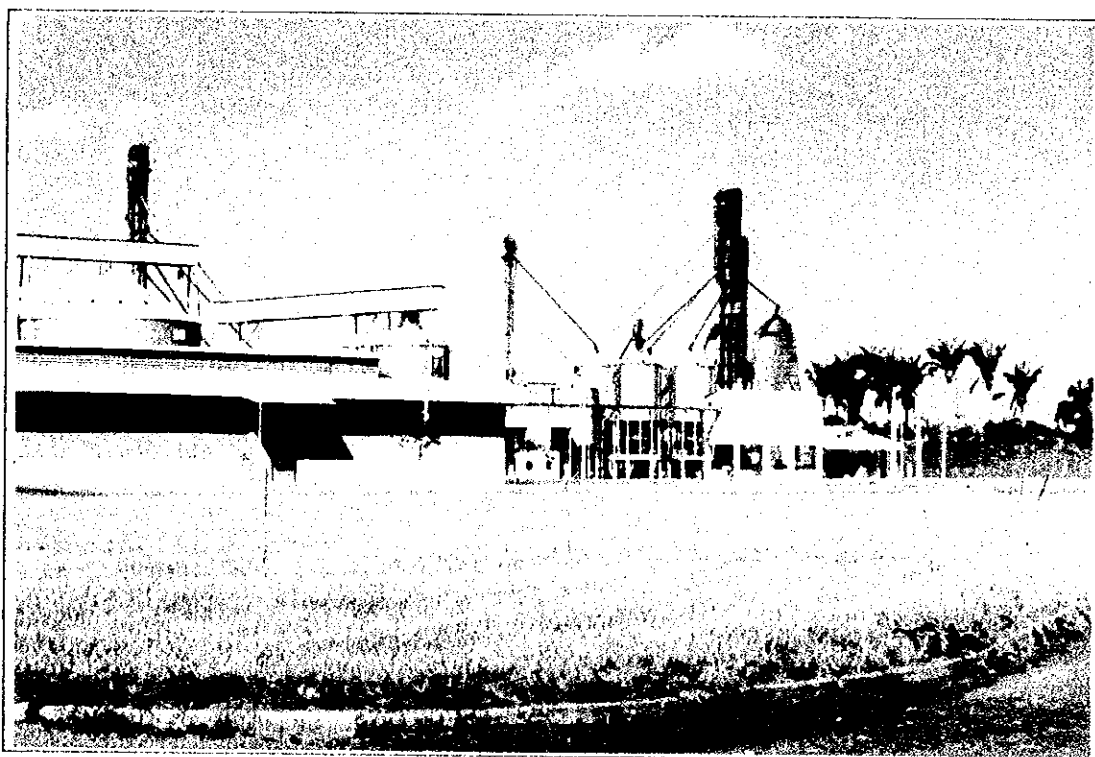


PHOTO 15 - SULANOR Project (Sul America group) in *Miguel Alves*, in the lower-medium Parnaíba lowlands: Rice production and industrial processing plant, in a 1,800 hectares irrigation perimeter. Plant started in 1985 with FINOR fiscal incentives. Productivity over 5 ton/ha in a two harvests per year basis, providing 400 direct jobs. Presently changing to cattle breeding

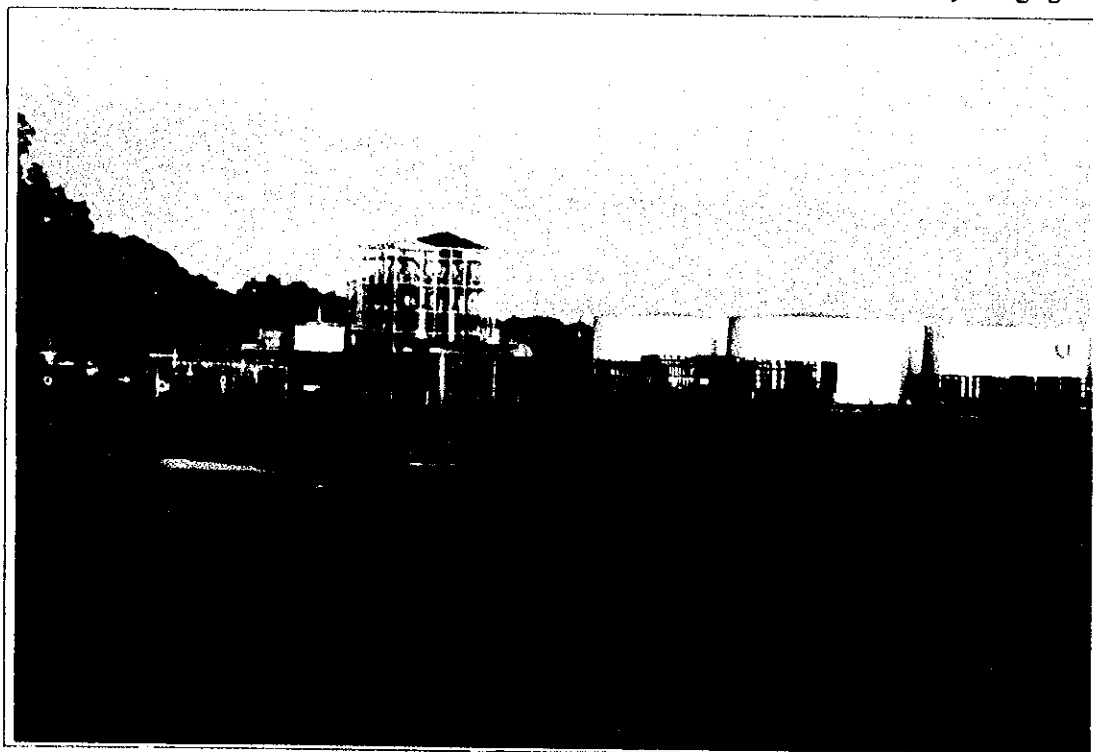


PHOTO 16 - *Cia. Industrial do Vale do Parnaíba's* sugar-cane alcohol plant in Teresina, with capacity for 65 million liters per year, financed by PROALCOOL (a governmental program). The sugar-cane culture is widely spread and principally destined to the production of distilled alcoholic liquor and lump of hard brown sugar (principally in amateurish ways) being the production of sugar of little significance. It is an important item in the importation of Piauí.



PHOTO 17 - PI-130 road in cattle breeding area, near *Amarante*, PI. The farm shown breeds cattle in extensive scale for butchering purposes.

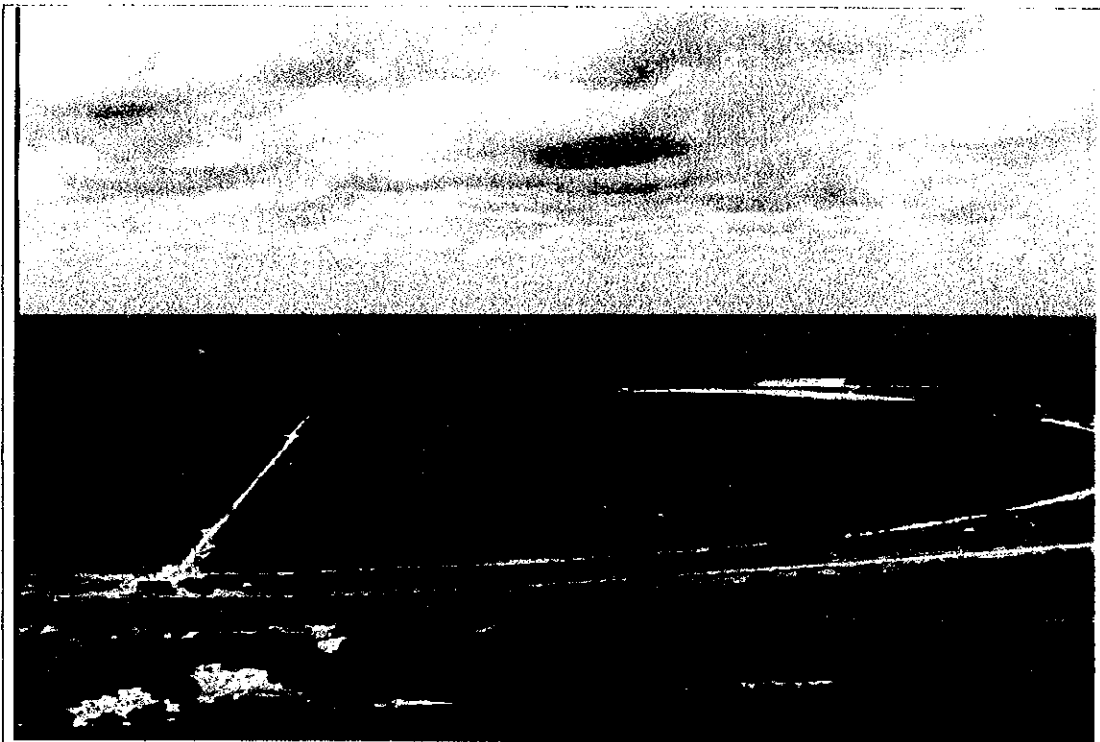


PHOTO 18 - *Platôs de Guadalupe* irrigation project under execution on right banks and along shorelines Boa Esperança Reservoir. Project total area is 32,000 ha, with a total planned 11,439 ha irrigated perimeter.

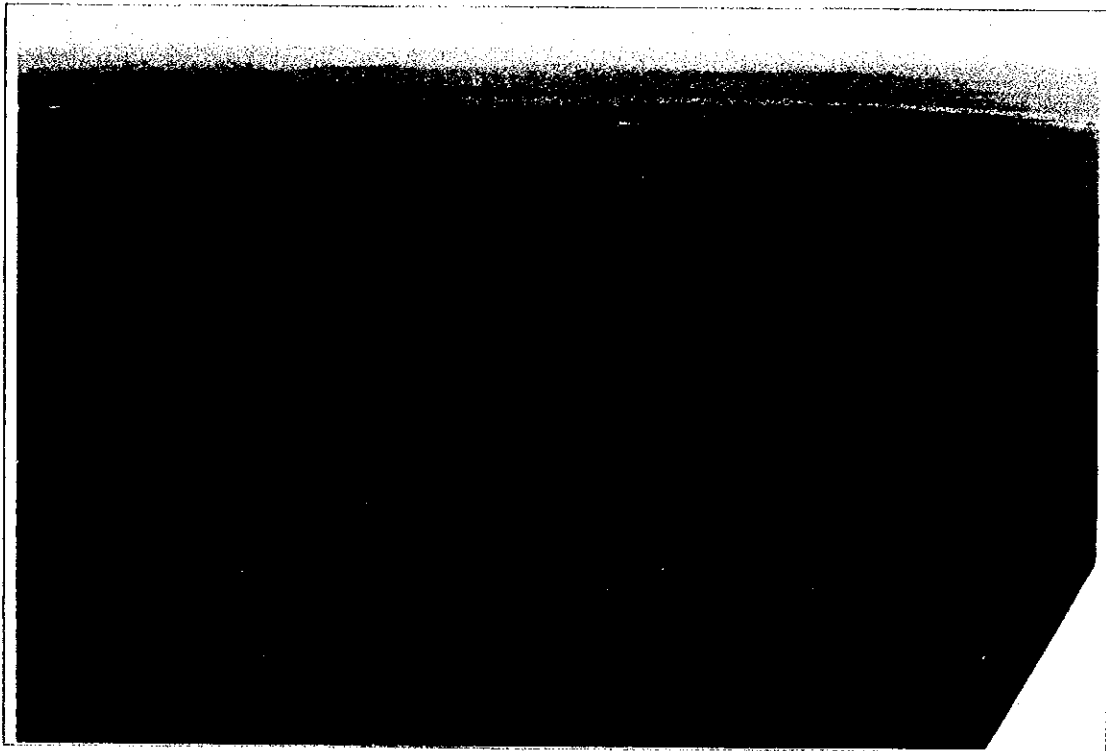


PHOTO 19 - *Fazenda Quixabá*, a big farming and cattle breeding enterprise with 32,000 ha in the Piauí's southwestern savannas, owned by a Ceará's group. Intensive chemical fertilization and soil correction with dolomitic limestone were applied, aiming at developing a 2,000 ha rice crops area. Soy crops were successfully developed in a 200 ha area.



PHOTO 20 - Farming and reforestation with cashew trees project in Piauí's southwestern savannas near Uruçuí. Due to unsatisfactory results of the cashew culture being obtained — because of inadequate environmental management and plague problems — many reforestation projects are abandoned in the region.

G. MAPS AND ILLUSTRATIONS

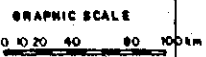
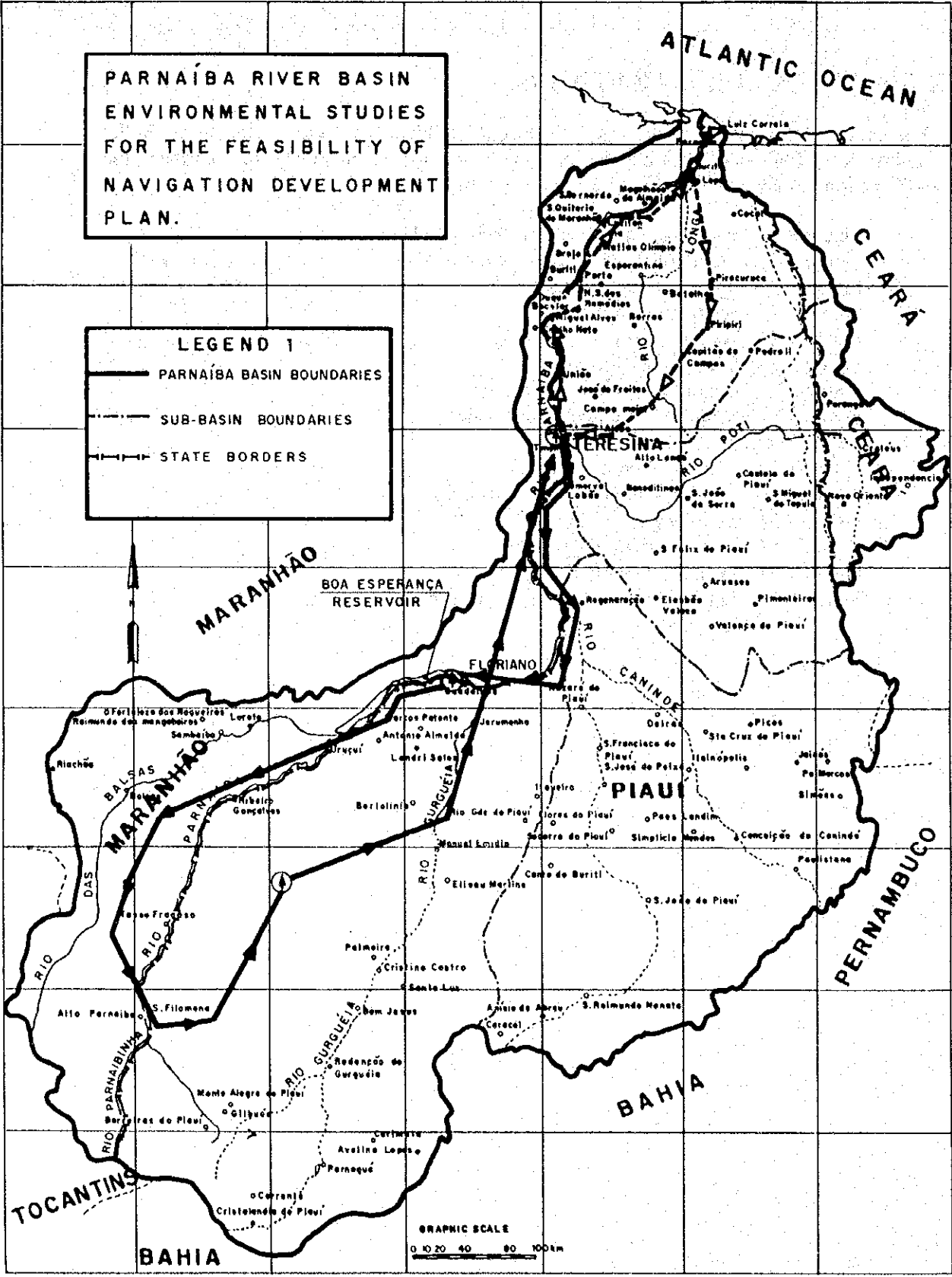
Mapping the information is a good way to illustrate problems and aspects pointed out in the report. The following illustrations are based on official mapping and cartographic information available in the data collected for the study:

- Figure # 1 - Field trip evaluations: overflight and land incursions
- Figure # 2 - Parnaíba River Basin physical boundaries
- Figure # 3 - Köppen climatic zones
- Figure # 4 - Precipitation systems
- Figure # 5 - Wettest seasons
- Figure # 6 - Mean annual rain fall
- Figure # 7 - Maximum 24 hours storms
- Figure # 8 - Geological formation (schematic)
- Figure # 9 - Relief schematic map
- Figure # 10 - Soil distribution (schematic)
- Figure # 11 - Morphoclimatic units - vegetation
- Figure # 12 - Main vegetation formations
- Figure # 13 - Present urban polarization
- Figure # 14 - Present situation of cargo flows
- Figure # 15 - Potential future cargo flows due to development of navigation.

**PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.**

LEGEND 1

- PARNÁIBA BASIN BOUNDARIES
- - - SUB-BASIN BOUNDARIES
- |—| STATE BORDERS



LEGEND 2

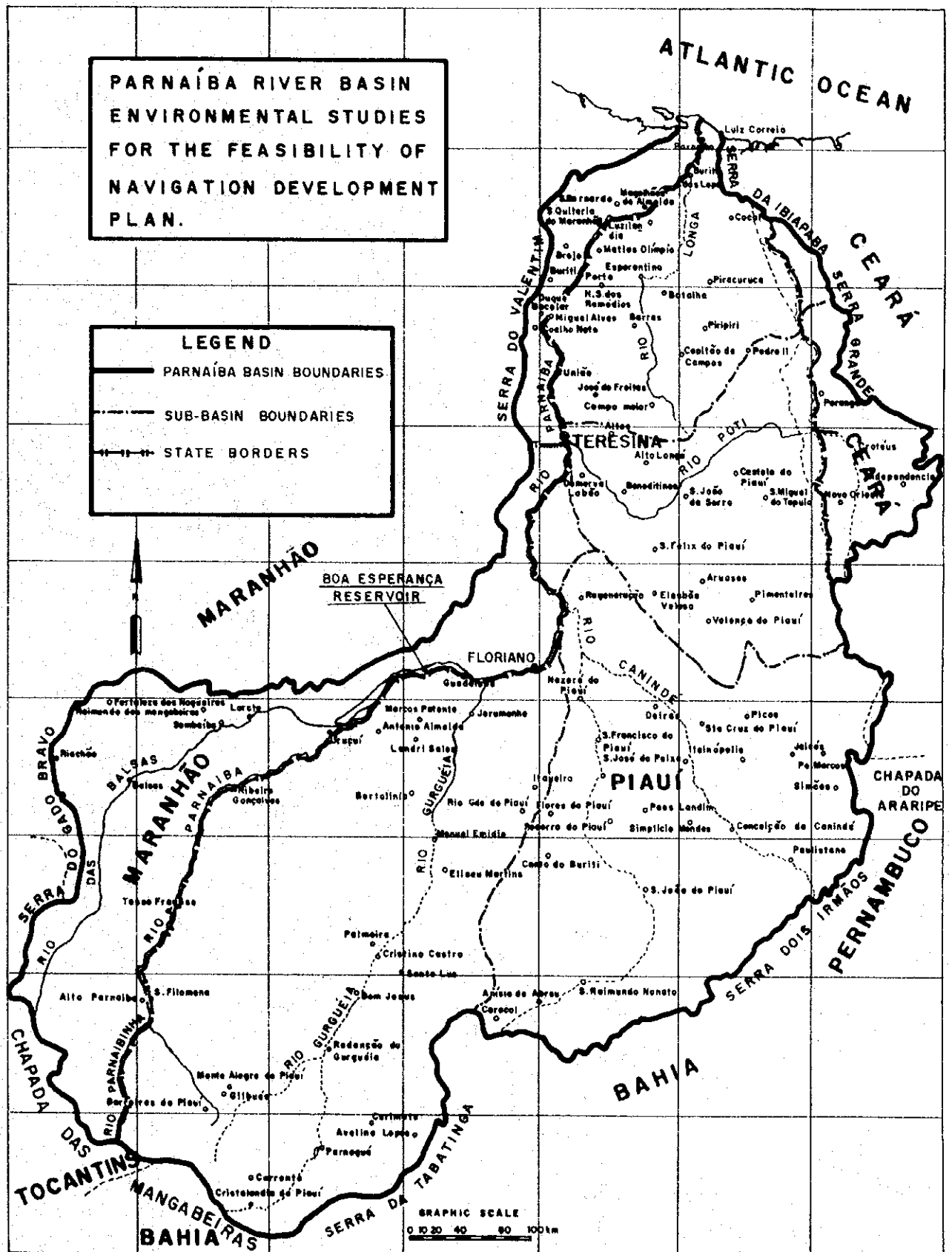
- ⊕ LANDING SITE
- AERIAL ROUTE
- - -> TERRESTRIAL ROUTE

**FIGURE 01
ENVIRONMENTAL IMPACT SURVEY
FIELD TRIP EVALUATIONS
OVER FLIGHT AND LAND INCURSIONS
OCTOBER, 1993**

**PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.**

LEGEND

- PARNÁIBA BASIN BOUNDARIES
- - - SUB-BASIN BOUNDARIES
- |—|— STATE BORDERS

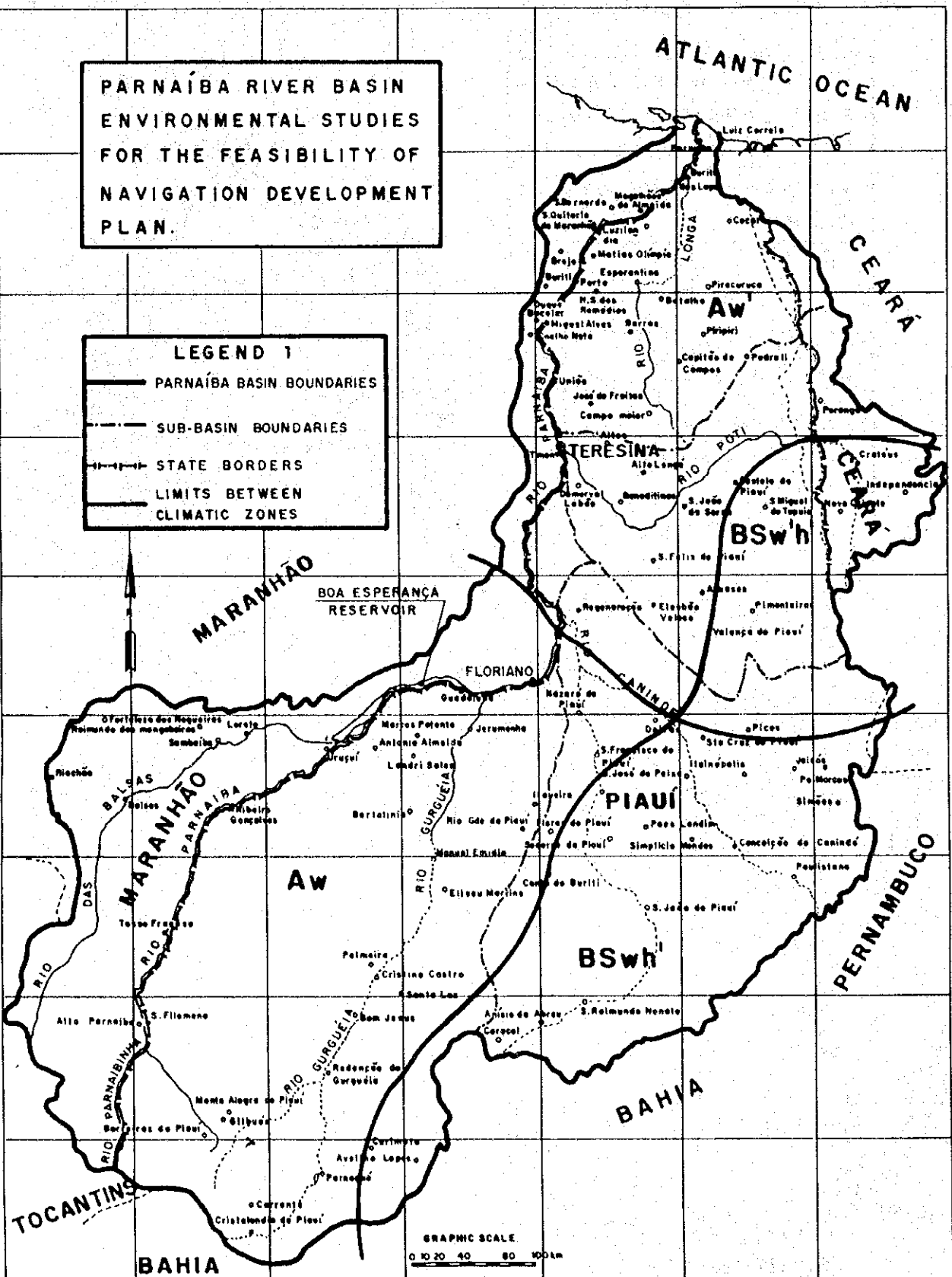


**FIGURE 02
PARNAIBA RIVER BASIN
PHYSICAL BOUNDARIES**

PARNAÍBA RIVER BASIN ENVIRONMENTAL STUDIES FOR THE FEASIBILITY OF NAVIGATION DEVELOPMENT PLAN.

LEGEND 1

- PARNAÍBA BASIN BOUNDARIES
- SUB-BASIN BOUNDARIES
- STATE BORDERS
- LIMITS BETWEEN CLIMATIC ZONES



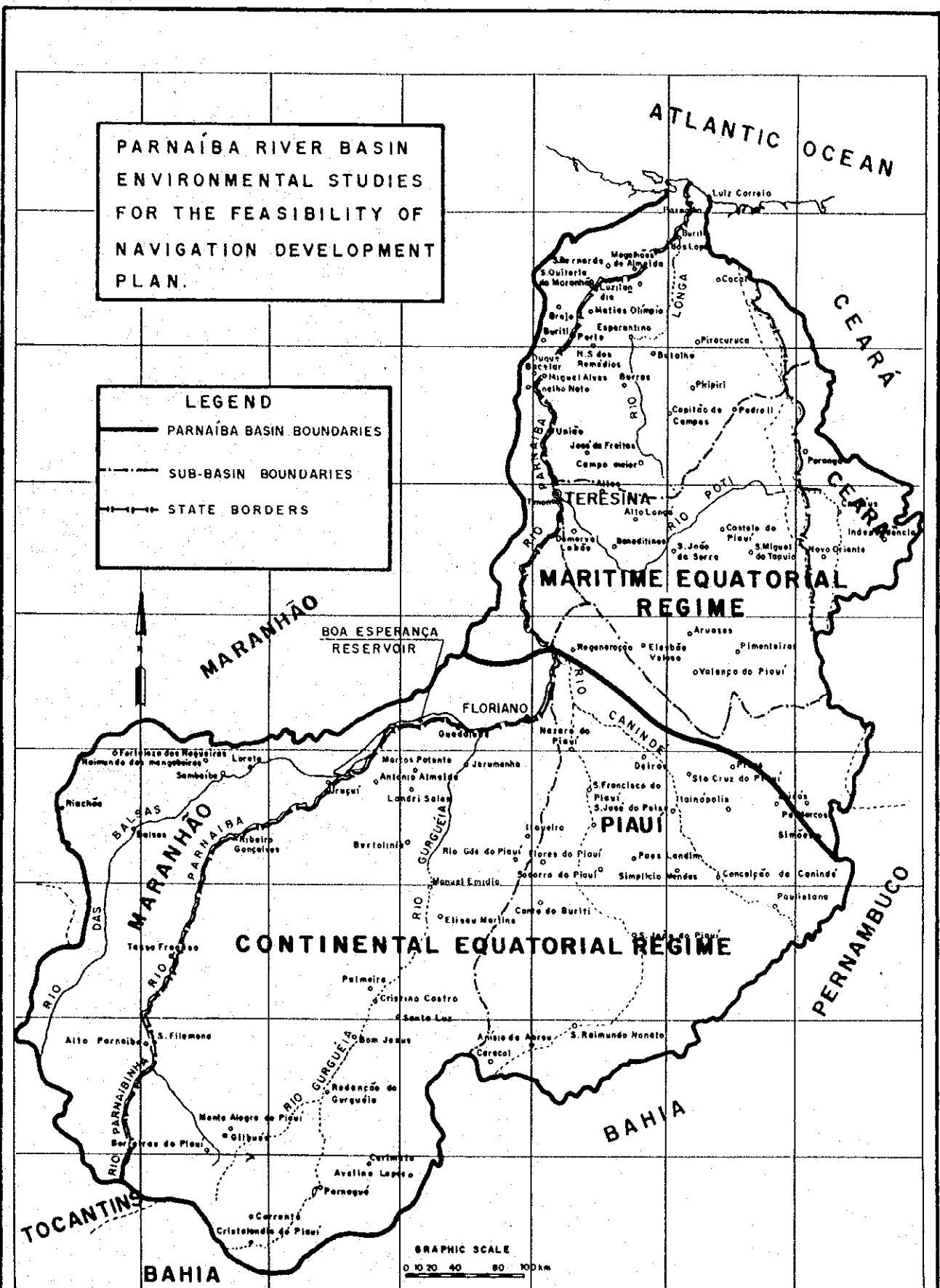
LEGEND 2

- Aw** - RAINY SUMMER, DRY WINTER
- Aw'** - RAINY AUTUMN, DRY WINTER
- BSw** - HIGH TEMPERATURES AND STRONG EVAPORATION IN SUMMER
- BSw'** - RAINY AUTUMN, VERY HOT CLIMATE

**FIGURE 03
KÖPPEN CLIMATIC ZONES**

A9-118






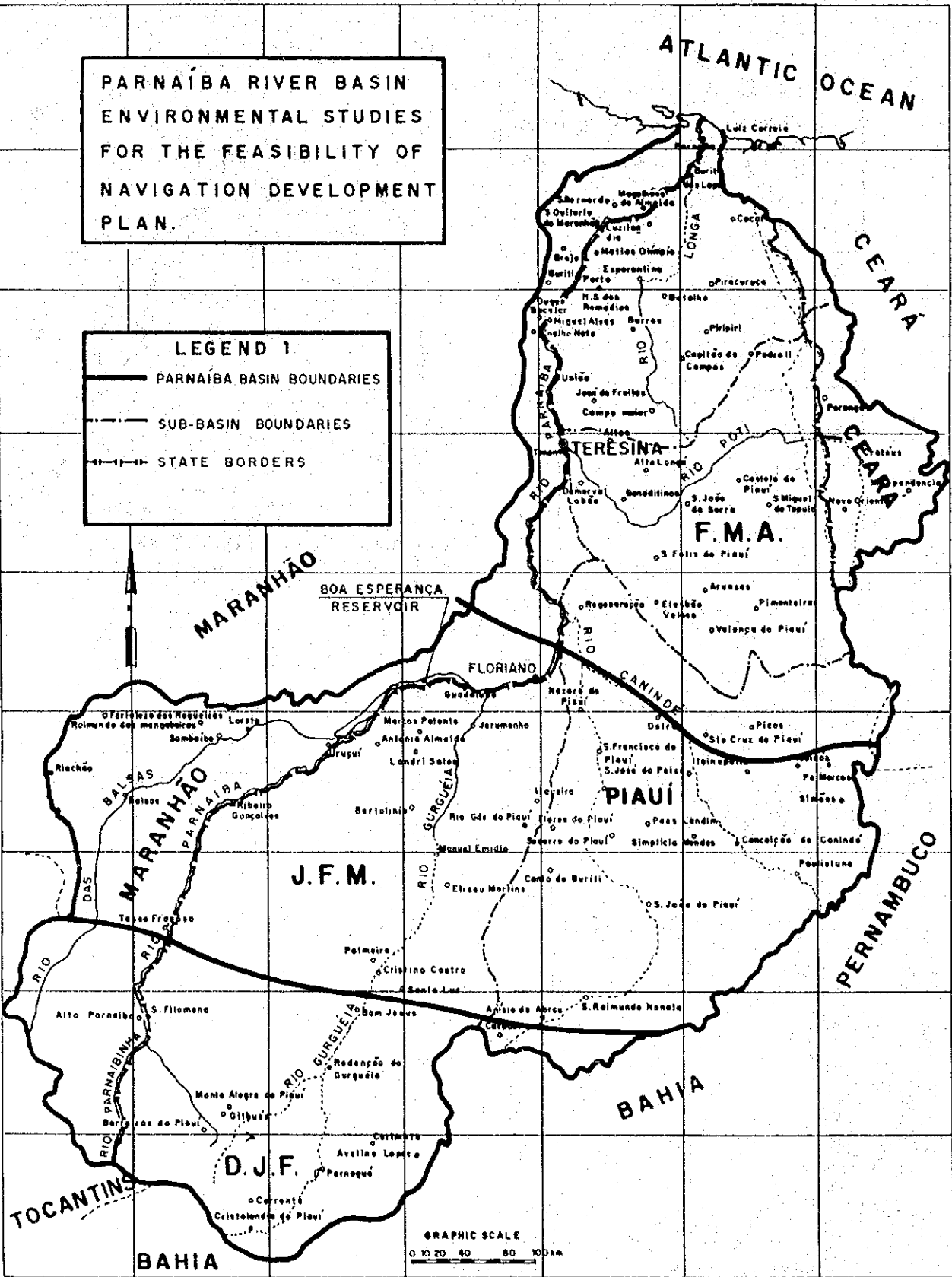


**FIGURE 04
PRECIPITATION SYSTEMS**

**PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.**

LEGEND 1

-  PARNAÍBA BASIN BOUNDARIES
-  SUB-BASIN BOUNDARIES
-  STATE BORDERS



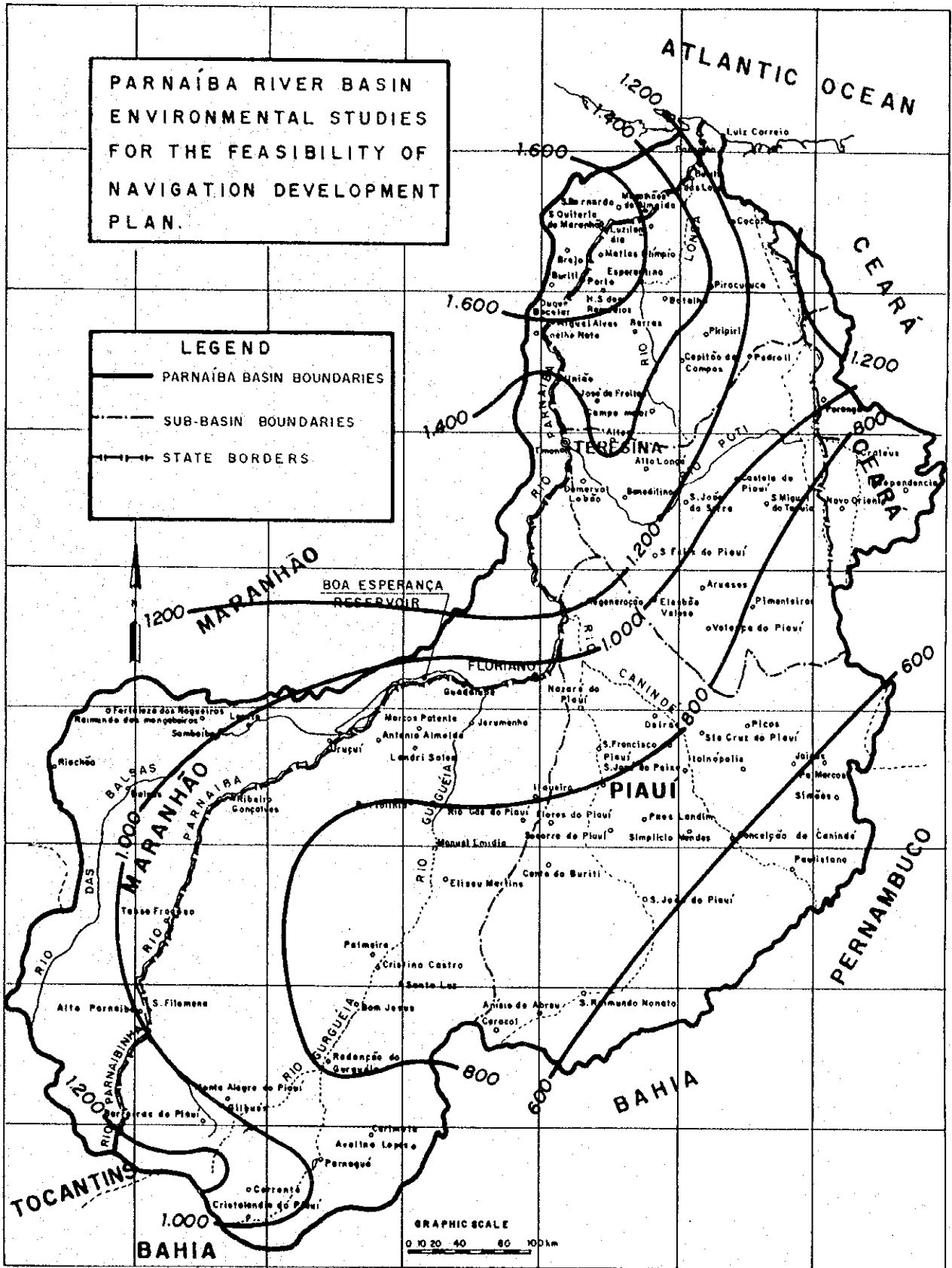
LEGEND 2

- D-** DECEMBER
- J-** JANUARY
- F-** FEBRUARY
- A-** APRIL

**FIGURE 05
WETTEST SEASONS**

**PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.**

- LEGEND**
- PARNÁIBA BASIN BOUNDARIES
 - - - SUB-BASIN BOUNDARIES
 - | | | STATE BORDERS

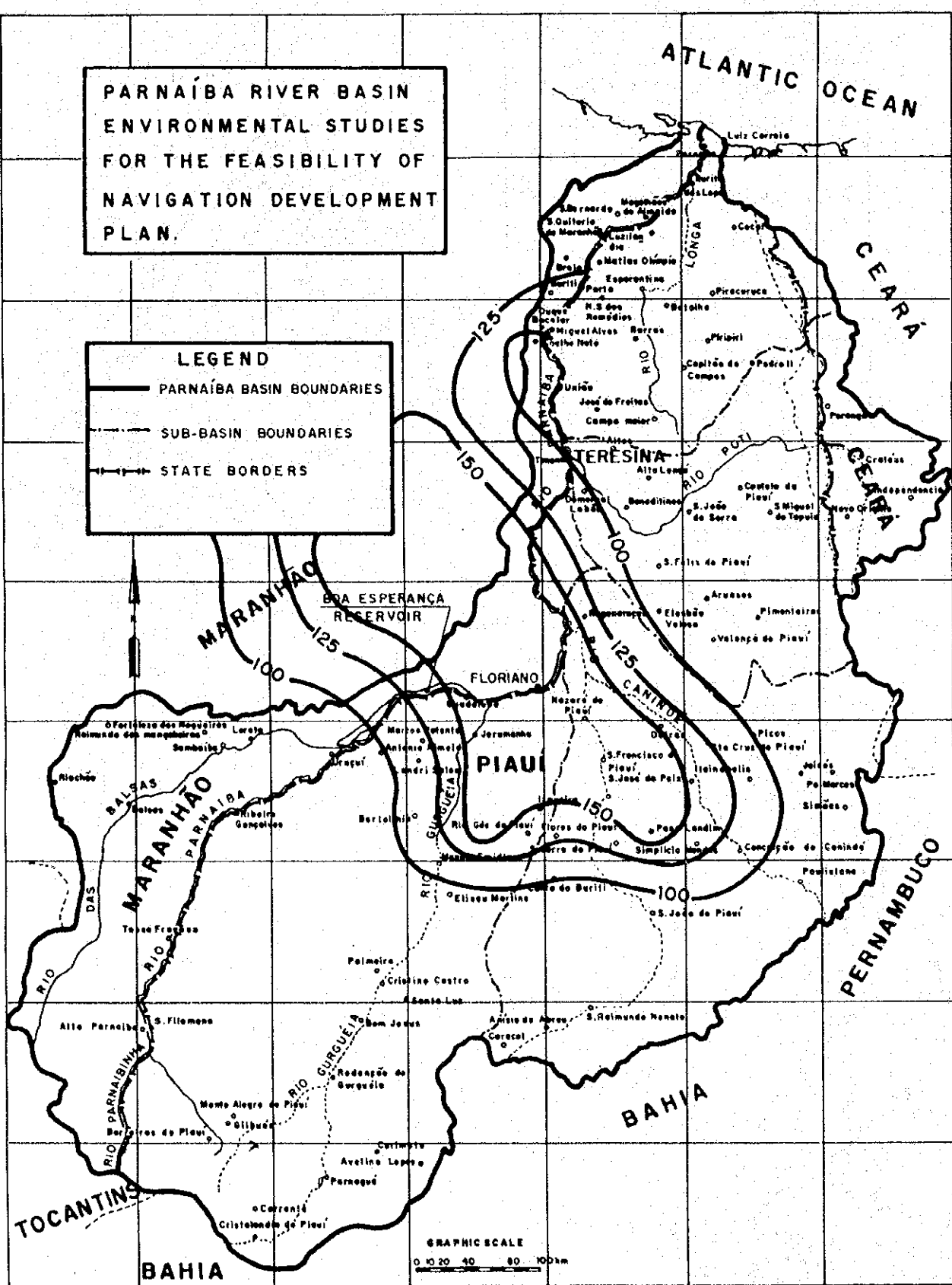


**FIGURE 06
MEAN ANNUAL RAIN FALL
(mm)**

**PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.**

LEGEND

- PARNÁIBA BASIN BOUNDARIES
- - - SUB-BASIN BOUNDARIES
- |— STATE BORDERS

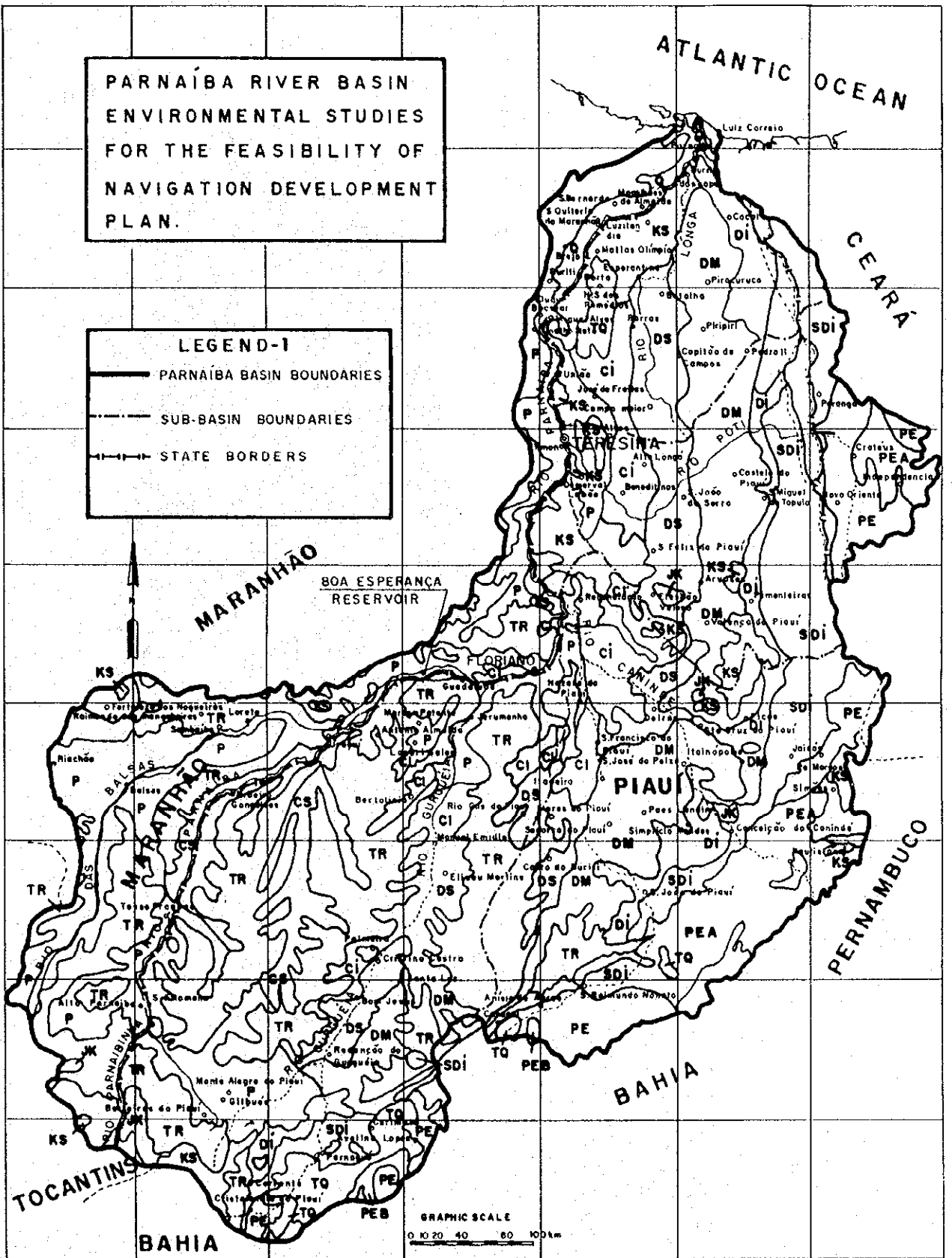


**FIGURE 07
MAXIMUM 24 HOURS STORMS
(mm)**

PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.

LEGEND-1

- PARNÁIBA BASIN BOUNDARIES
- - - SUB-BASIN BOUNDARIES
- |—|— STATE BORDERS



LEGEND-2

- | | | |
|--------------------------|--------------------------|----------------------------|
| Q - QUATERNARY | P - PERMIAN | PEA - PRÉ CAMBIAN A |
| TO - TERTIARY | CI - LOWER CARBONIFEROUS | PEB - PRÉ CAMBIAN B |
| KS - UPPER CRETACEOUS | DS - UPPER DEVONIAN | PE - PRÉ CAMBIAN UNDIVIDED |
| JK - JURASSIC-CRETACEOUS | DM - MEDIUN DEVONIAN | CS - UPPER CARBONIFEROUS |
| TR - TRIASSIC | DI - LOWER DEVONIAN | |
| | SDI - SILURIAN DEVONIAN | |

FIGURE 08
GEOLOGICAL FORMATION
(SCHEMATIC)

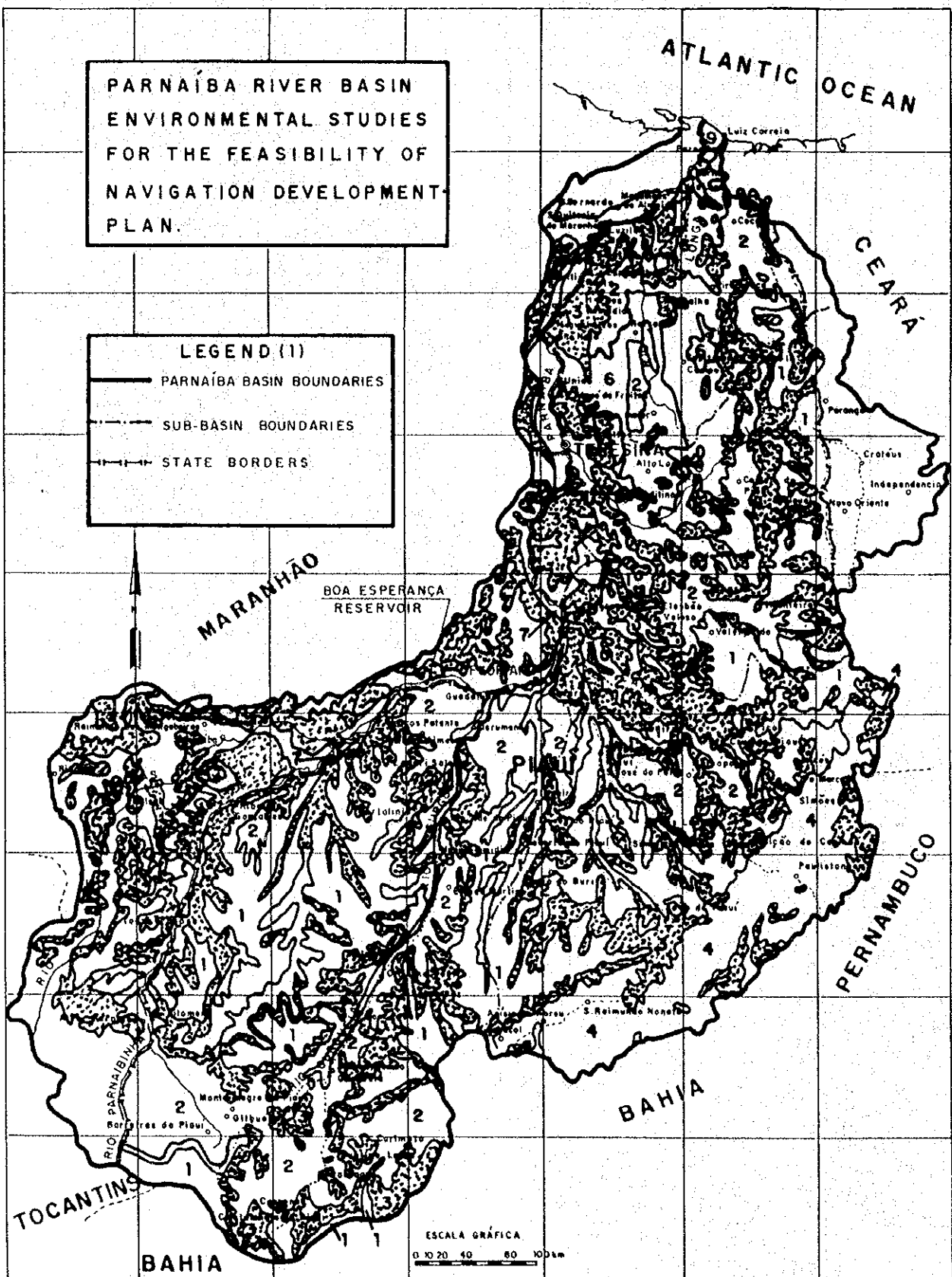
ORIGIN: IBGE ATLAS NACIONAL DO BRASIL-REGIÃO NORDESTE

OCTA

**PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.**

LEGEND (1)

- PARNÁIBA BASIN BOUNDARIES
- - - SUB-BASIN BOUNDARIES
- |—|— STATE BORDERS



LEGEND (2)

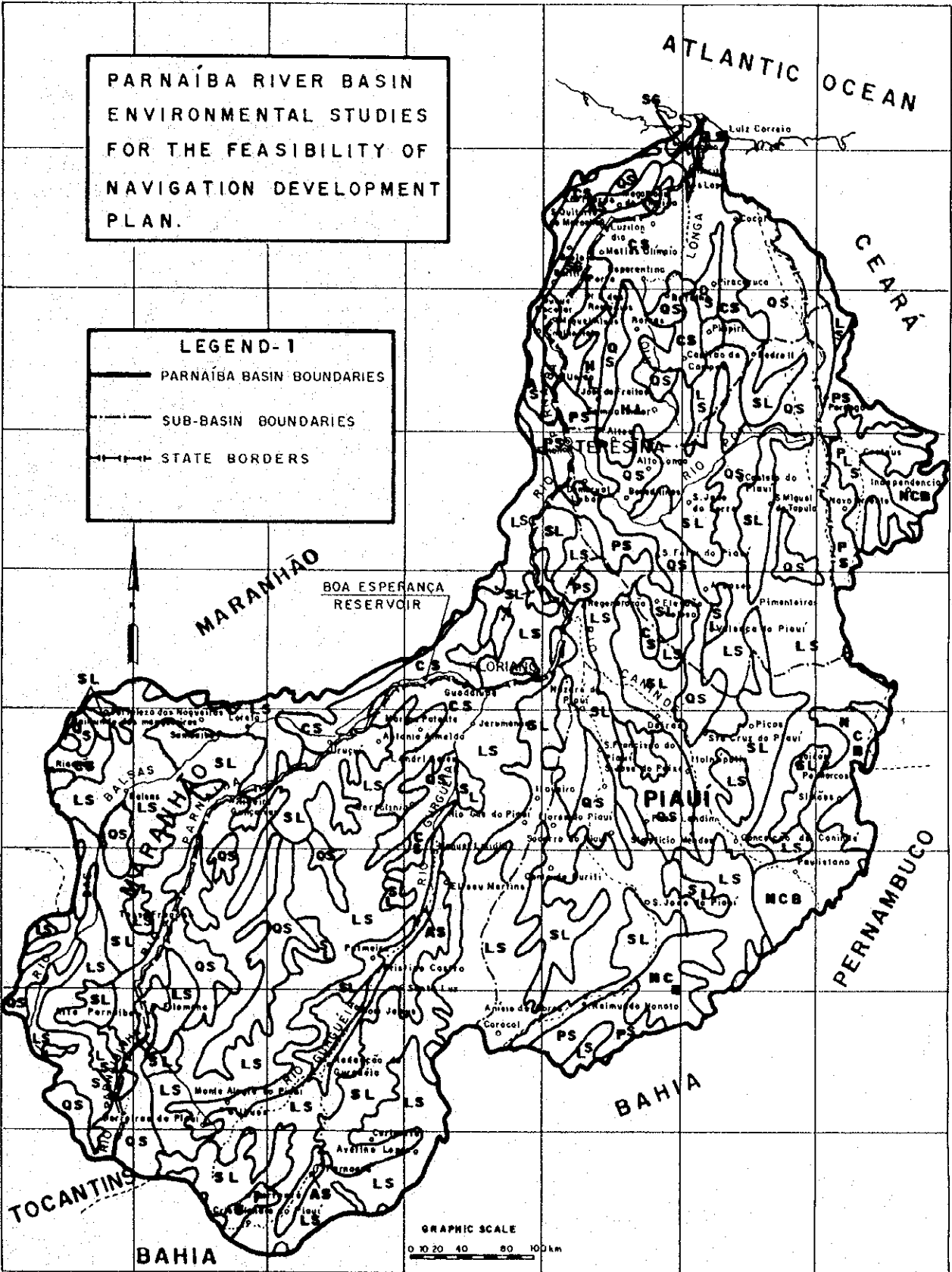
- | | | | |
|---|------------------------|---|--------------------------------|
| 1 | HIGH PLATEAU | 5 | INTER MOUNTAIN VALLEYS |
| 2 | LOW PLATEAU | 6 | REGION OF CAMPO MAIOR |
| 3 | ONDULATED SURFACES | 7 | PARNAÍBA VALLEY |
| 4 | PEDIPLANATION SURFACES | 8 | FLUVIAL FLATLANDS AND TERRACES |
| | | 9 | COAST LINE A9-124 |

**FIGURE 09
RELIEF SCHEMATIC MAP**

PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.

LEGEND-1

- PARNÁIBA BASIN BOUNDARIES
- - - SUB-BASIN BOUNDARIES
- |—|— STATE BORDERS



LEGEND-2

LS- LATOSOLS	NCB- NON CALCAREOUS BROWNISH SOILS
QS- QUARTZOUS SANDS SOILS	CS- UNDIVIDED CONCRETIONED SOILS
PS- PODZOLIC SOILS	PLS- PLAIN SOILS
SL- LITHOLIC SOILS	SB- GLEY SOILS A9-125
AS- ALLUVIAL SOILS	NL- HYDROMORPHIC LATERITE

FIGURE 10
SOIL DISTRIBUTION
(SCHEMATIC)

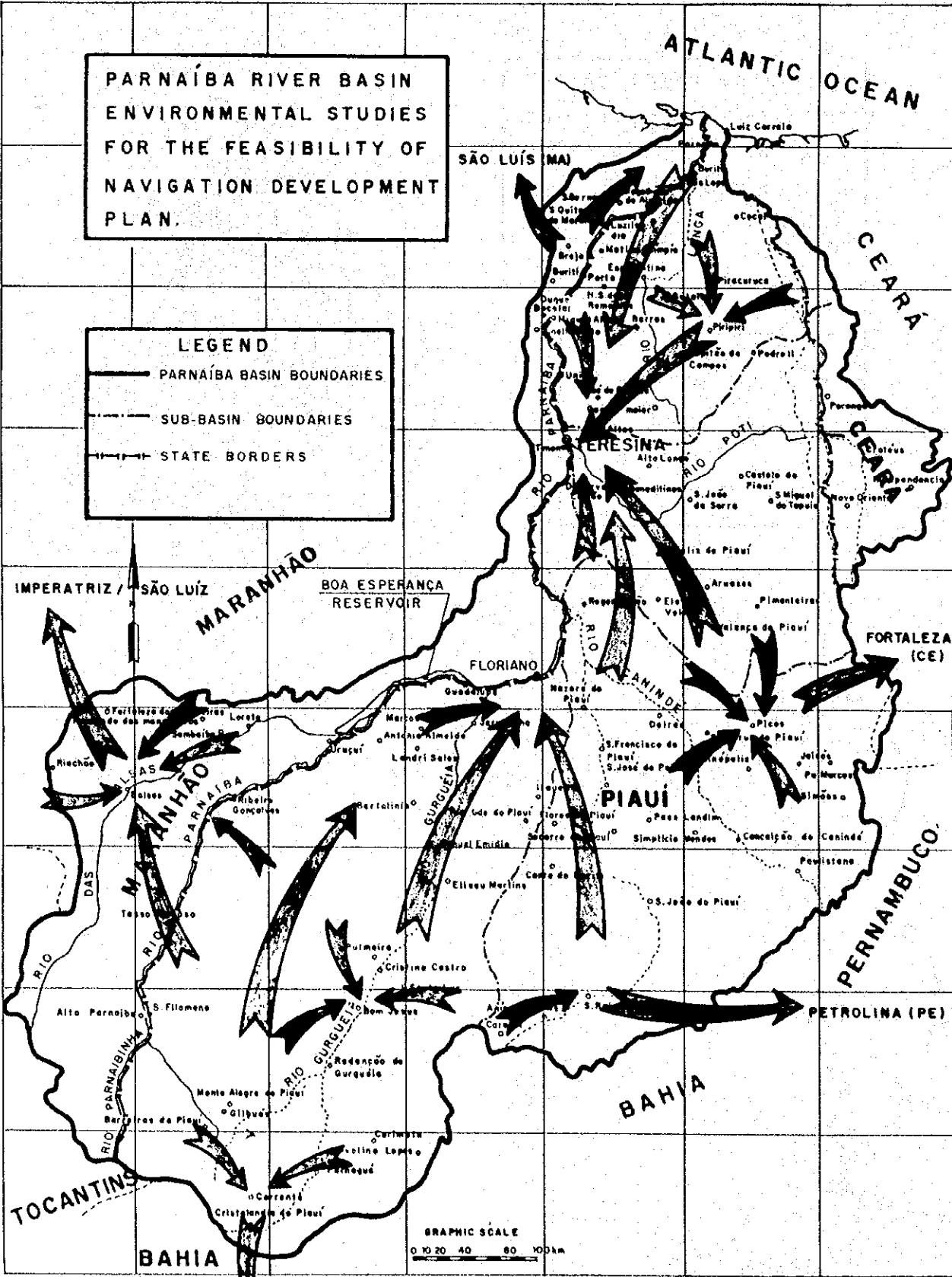
OCTA

ORIGIN: IBGE ATLAS NACIONAL DO BRASIL - REGIÃO NORDESTE AND ATLAS DO PIAUÍ

**PARNAÍBA RIVER BASIN
ENVIRONMENTAL STUDIES
FOR THE FEASIBILITY OF
NAVIGATION DEVELOPMENT
PLAN.**

LEGEND

- PARNÁIBA BASIN BOUNDARIES
- - - SUB-BASIN BOUNDARIES
- |—| STATE BORDERS



**FIGURE 13
PRESENT URBAN POLARIZATION**

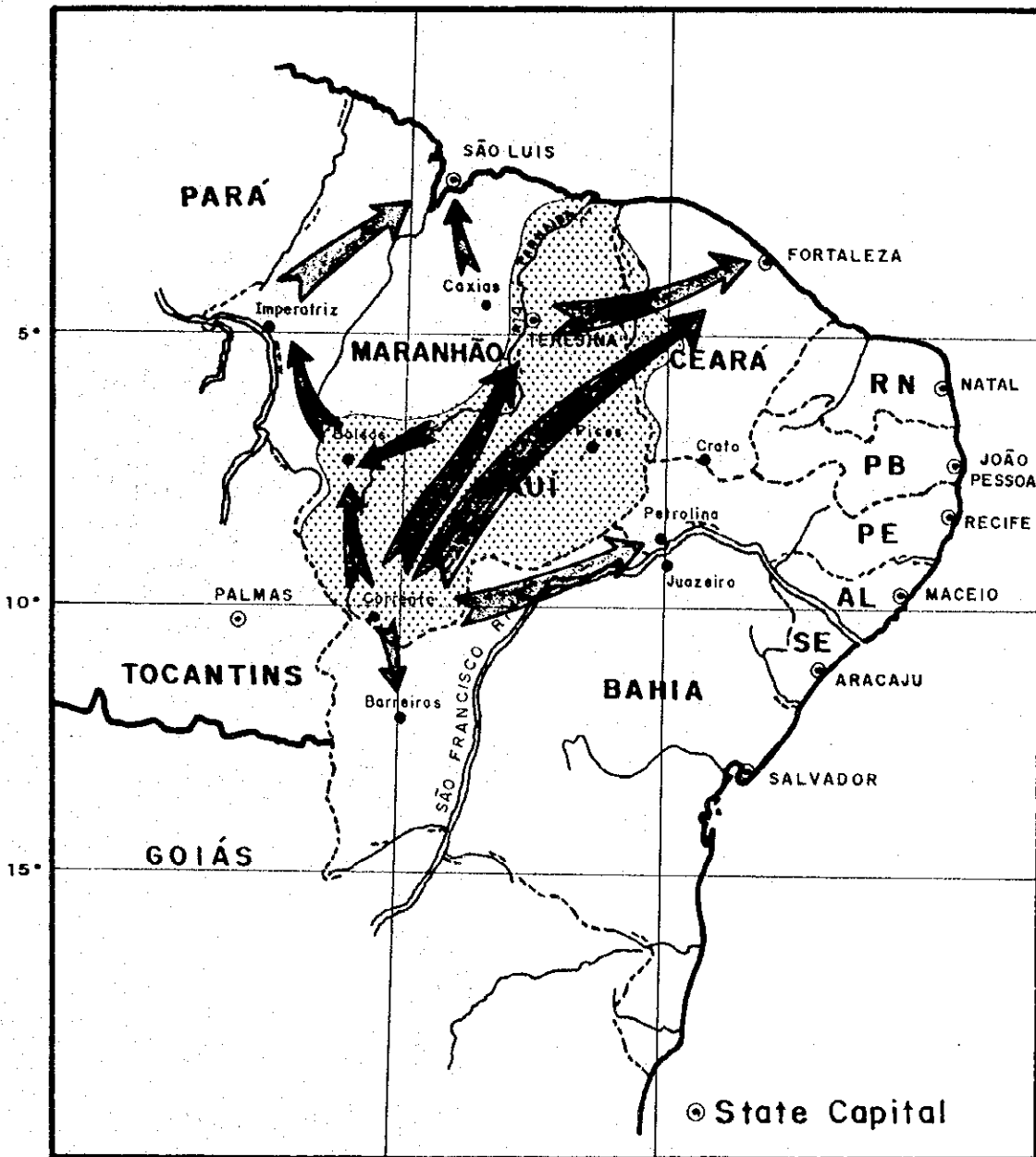
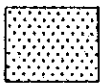


FIGURE 14
PRESENT SITUATION OF
CARGO FLOWS

LEGEND

 PARNAÍBA RIVER BASIN

 STATE BORDERS

PARNAÍBA RIVER BASIN
 ENVIRONMENTAL STUDIES
 FOR THE FEASIBILITY OF
 NAVIGATION DEVELOPMENT
 PLAN.

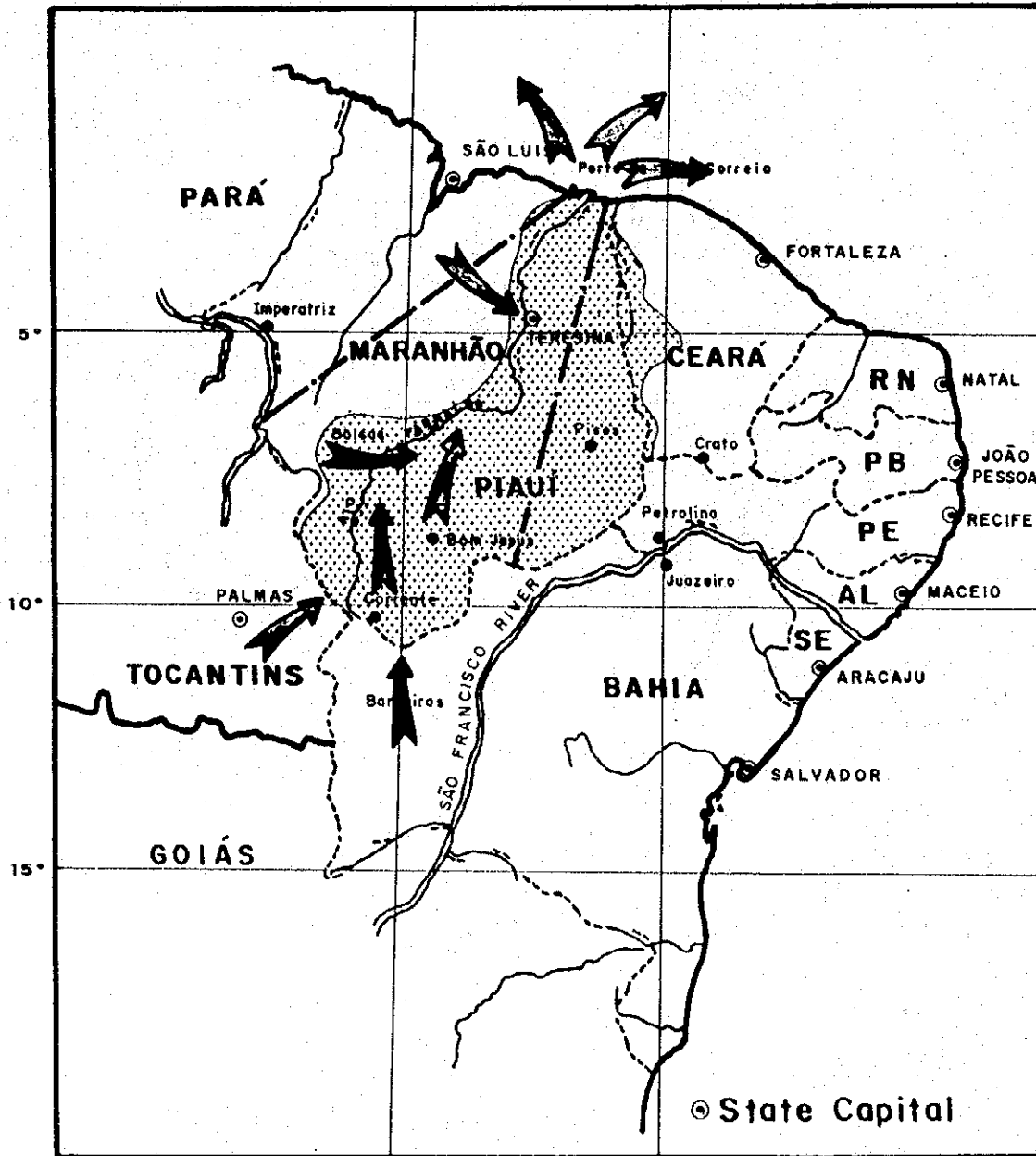
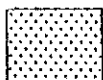




FIGURE 15
POTENTIAL FUTURE CARGO FLOWS DUE TO
DEVELOPMENT OF NAVIGATION

LEGEND

-  PARNAÍBA RIVER BASIN
-  STATE BORDERS
-  AREA OF INFLUENCE OF THE FUTURE WATERWAY

PARNAÍBA RIVER BASIN
 ENVIRONMENTAL STUDIES
 FOR THE FEASIBILITY OF
 NAVIGATION DEVELOPMENT
 PLAN.

