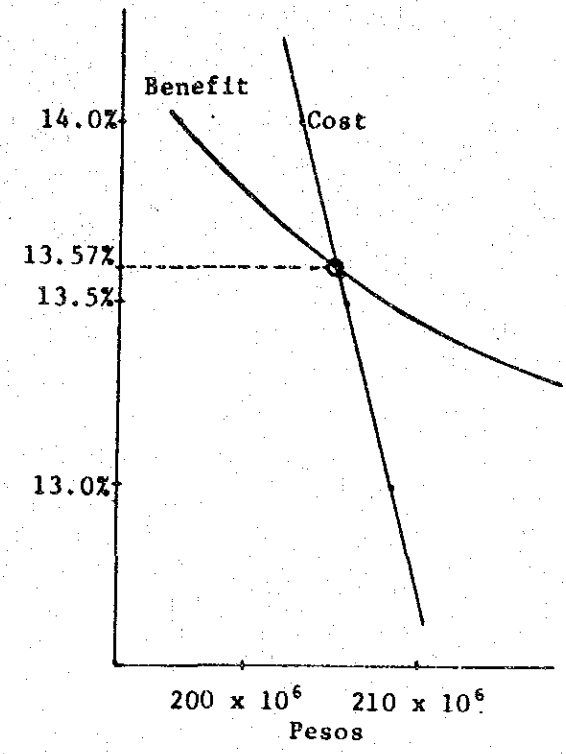


Note: (1) Useful life of pump is assumed at 30 years.

(2) Since the gates are replaced at every 8 years, the necessary replacement cost is added at 12-th, 20-th and 28-th year.

(3) It is expected that agricultural production will be on the beam from 7-th year.

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|---|---|
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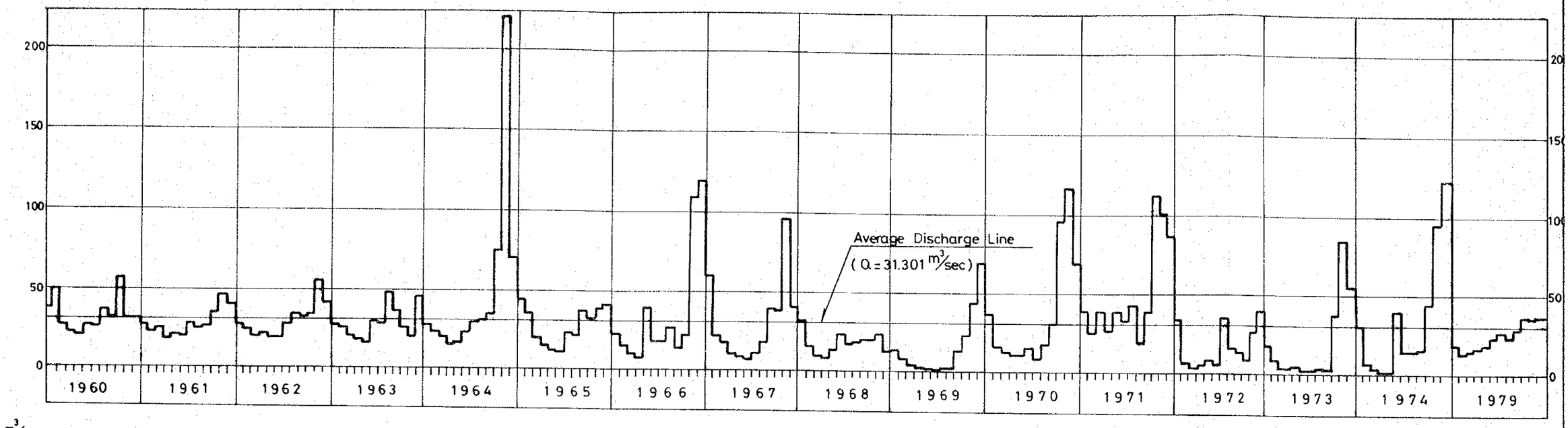
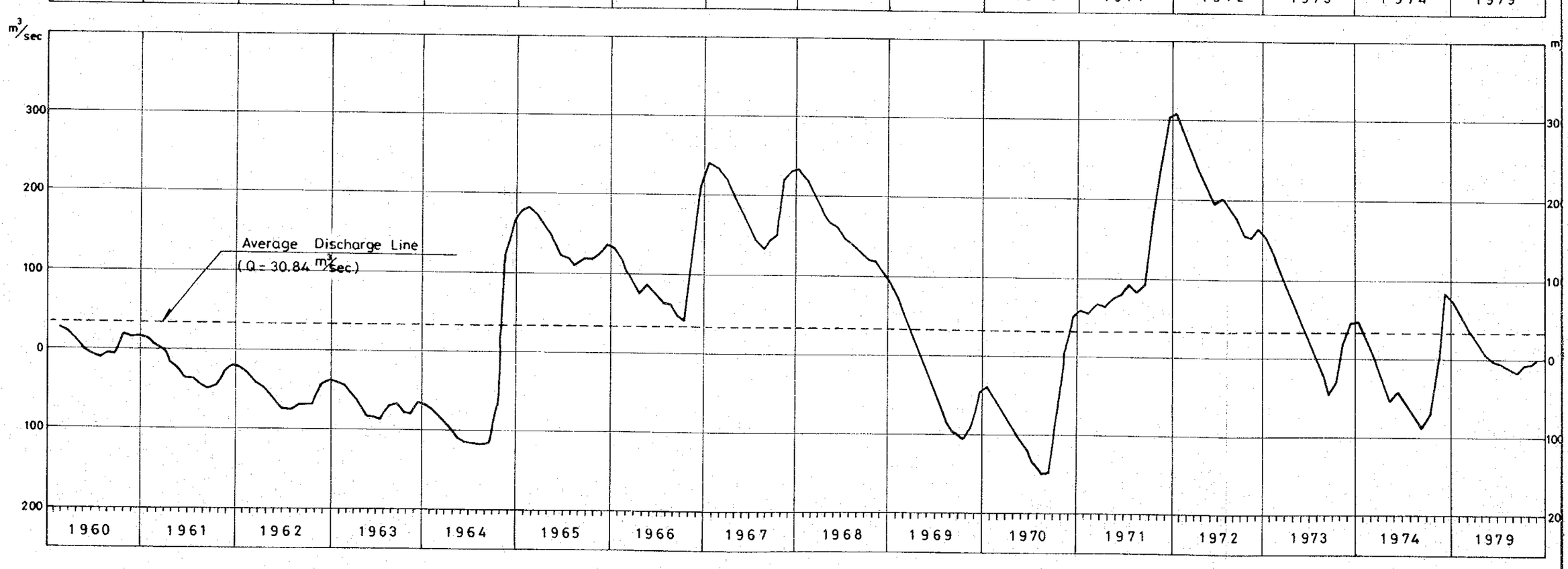
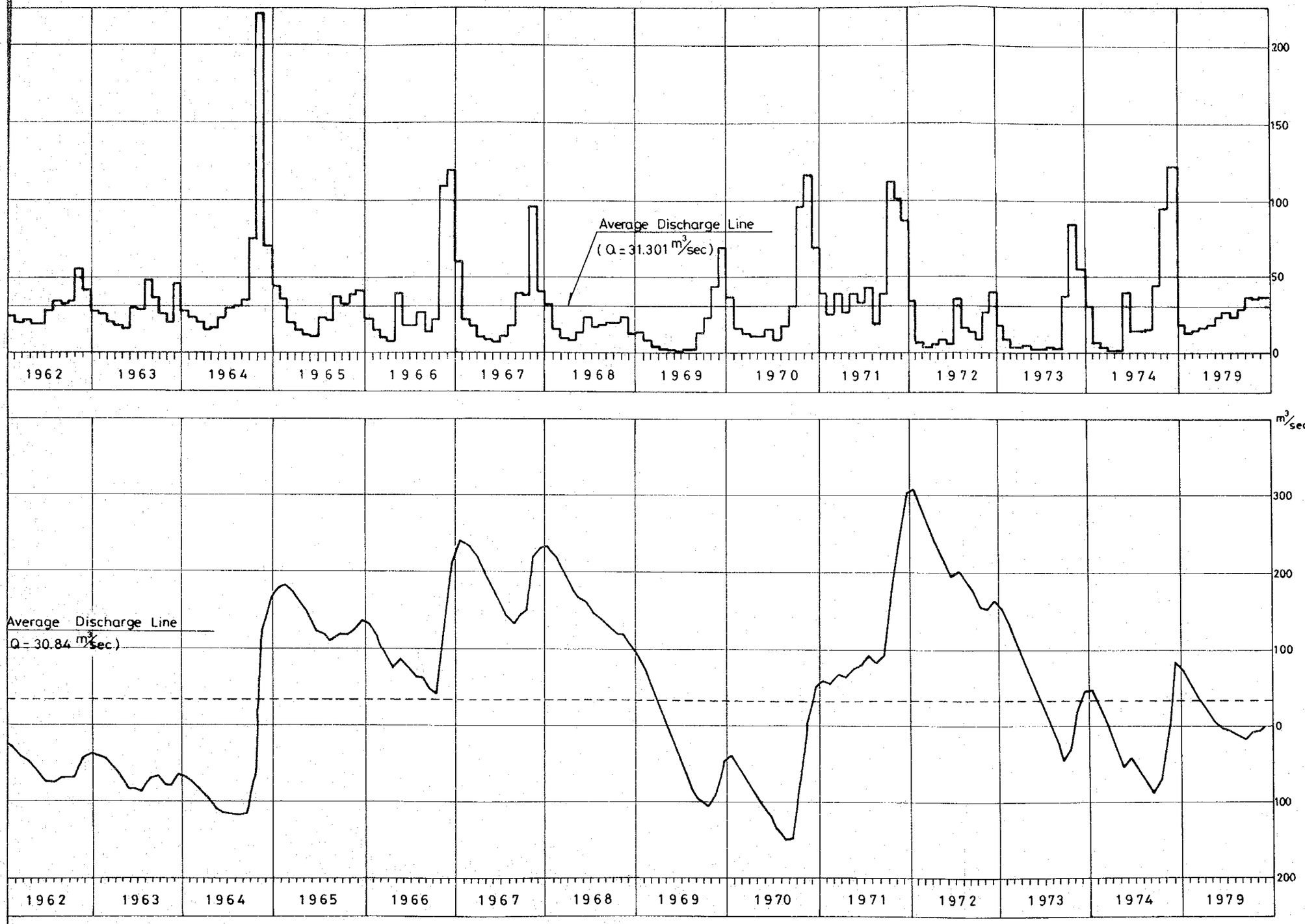
| Benefits of Proposed Sites<br>No.3 - No.7 | |
| October 1980 | Fig. 3-7-9 |

## Monthly Discharge and Mass Curves at No. 3 Damsite



## Monthly Discharge and Mass Curves at No. 3 Damsite




| |
|---|
| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines |
| Japan International Cooperation Agency |
| Monthly Discharge and Mass Curves<br>at No. 3 Damsite |
| October 1980 Fig. 2-4-24 |

## 2.4.4. Sedimentation

### (1) General

In planning a hydroelectric power plant, the degree of sedimentation is an important factor to determine the capability of the plant to function and operate as expected for many years of its service life. Generally, estimating the amount of deposited silt calls for a survey of bed materials and actual observation of suspended sediments and bed loads. Based on these, a sediment rating curve is created to determine the annual sedimentation. During this survey, sedimentation was measured for the first time at the project site. Fig. 2-4-25 shows the positions where actual observations were conducted. For analytical study, both of the following methods are employed.

i) Hydraulic computation of measurements using various formulas

ii) Experiential estimate of sedimentation referring to the values obtained at the basin of the Agno River and the Pampanga River in the vicinity of the Cagayan River watershed.

### (2) Study of sedimentation

i) Sedimentation determined by actual observation

To estimate the amount of sediments, a survey was conducted along the Diduyon River for the distribution of bed load grading. The obtained distribution is shown in Fig. 2-4-26, and the measurements are listed in Table 2-4-16. From the grain diameter of river bed gravels, a calculation was made using the equation proposed by various reserches. The result is presented in Fig. 2-4-27. The sedimentation is calculated through the formula of Lane-Kalinske. The variation of riverflow is worked out based on the parallel discharge duration table (Table 2-4-17) for the Diduyon No. 3 Damsite. The relation between the amount of sedimentation Qs ($m^3$/sec) and the rate of discharge Q ($m^3$/sec) is represented by $Qs = \alpha Q^{\beta}$. Then, with the Lane-Kalinske

formula applied, $\alpha = 1.003 \times 10^{-5}$ and $\beta = 1.5993$ are obtained. Calculation through the above equation provides the annual sedimentation $V_1 = 0.11 \times 10^6$ m$^3$, and the sedimentation for 100 years $V_{100} = 11 \times 10^6$ m$^3$. For the basin area of 477 km$^2$, the unit sedimentation per square kilometer for each year is estimated at 231 m$^3$ (the annual rate of erosion is 0.23 mm).

ii) Sedimenation estimated from the values available in the vicinity of the Cagayan River watershed

Table 2-4-18 shows the average annual sedimentation (m$^3$) and the average annual discharge (m$^3$/sec) obtained from the values measured at 19 places in the watershed of the above two rivers. The relation between the average annual sedimentation Qs (m$^3$/sec) and the average annual discharge Q (m$^3$/sec) is represented by $Qs = \alpha Q^m$. From the above measurements, $\alpha = 2.0 \times 10^{-5}$ and $\beta = 1.8$ are obtained as shown in Fig. 2-4-28. These values nearly envelop the upper limits of the measured sediments. Application of this equation leads to the estimate of the annual sedimentation $V_1$ for the average annual discharge Q = 30.84 m$^3$/sec (No.3 Damsite, basin area 477 km$^2$):

$$V_1 = 2 \times 10^{-5} \times (30.84)^{1.8} \times 365 \times 24 \times 60 \times 60$$
$$= 302.164 \text{ m}^3/\text{year} = 0.303 \times 10^6 \text{ m}^3/\text{year},$$

Hence, the centennial sedimentation $V_{100} = 31 \times 10^6$ m$^3$. While if the equation $Qs = \alpha Q^\beta$ is used with the discharge duration curve (Table 2-4-17) generated by the parallel method, the annual sedimentation $V_1 = 0.528 \times 10^6$ m$^3$ and the centennial deposit $V_{100} = 53 \times 10^6$ m$^3$ is adopted as the design sedimentation. With this value assigned to the basin area of 477 km$^2$ (No.3 Damsite), 1,107 m$^3$/km$^2$/year (the annual erosion rate 1.1 mm) is obtained.

(3) From the above results, the centennial sedimentation for the No.3 Damsite is estimated at $V_{100} = 53 \times 10^6$ m$^3$. According to the stage-capacity curve for the reservoir, the design elevation of deposited sediments is EL 608 m. Accordingly, a margin of 12 m will be allowed between the design low water level and the surface of sedimentation. In the same way, the centennial sedimentation for the No.2 Damsite $V_{100} = 50 \times 10^6$ m$^3$ is obtained. For this value, the design elevation of

sedimentation is EL 613.5 m (Fig. 2-4-29). The above values are the product of calculation with a method of estimating sedimentation evenly distributed over the entire reservoir bed. Practically, however, not all the sediments enter the dead water region of the reservoir. In the process of sedimentation, part of the silt is also deposited in the vicinity of the upstream terminal of the reservoir. Therefore, it is necessary to pay due attention to the condition of sedimentation even after completion of the reservoir.

Table 2-4-16 Observed Sediment Loads

| Test Pit No. / Depth, meters / Location | | TP - 3<br>0 - 0.80<br>Biyoy River | | | T - 5<br>0 - 0.80<br>Siguem River | | |
|---|---|---|---|---|---|---|---|
| 1) Gradation Analysis | | | | | | | |
| Sieve Size | | Continuous Grading | Minus No.4 Sieve | Plus No.4 Sieve | Continuous Grading | Minus No.4 Sieve | Plus No.4 Sieve |
| Percent Passing | 6 inches | - | | - | - | | - |
| | 4 " | 100.0 | | 100.0 | 100.0 | | 100.0 |
| | 2 " | 91.8 | | 86.3 | 74.4 | | 65.9 |
| | 1½ " | 84.1 | | 73.6 | 64.4 | | 52.7 |
| | 1 inch | 72.6 | | 54.4 | 52.4 | | 36.8 |
| | 3/4 " | 64.8 | | 41.4 | 46.0 | | 28.2 |
| | 1/2 " | 55.4 | | 25.8 | 37.9 | | 17.5 |
| | 3/8 " | 49.8 | | 16.5 | 29.6 | | 12.0 |
| Percent Passing | No. 4 | 39.9 | 100.0 | | 24.7 | 100.0 | |
| | No. 8 | 31.2 | 78.1 | | 17.3 | 69.9 | |
| | No. 16 | 22.1 | 55.3 | | 10.1 | 41.0 | |
| | No. 50 | 13.9 | 34.8 | | 5.7 | 23.1 | |
| | No. 300 | 5.6 | 14.1 | | 2.7 | 11.1 | |
| | No. 100 | 2.1 | 5.2 | | 1.3 | 5.3 | |
| | No. 200 | 0.5 | 1.4 | | 0.7 | 2.8 | |
| | F. M. | - | 3.13 | | | 3.50 | |
| 2) Composition, % | | | | | | | |
| Gravel | | 60.1% | | | 75.3% | | |
| Sand | | 39.9% | | | 24.7% | | |
| 3) Unit Weight, pof | | | | | | | |
| a) Dry Loose | | | 95.25 | 108.0 | | 93.75 | 111.94 |
| b) Dry Rodded | | | 102.75 | 111.0 | | 101.25 | 117.94 |
| 4) Specific Gravity Tests | | | | | | | |
| Sat. Sur. Dry cond. | | | 2.59 | 2.68 | | 2.59 | 2.70 |
| 5) Absorption, % | | | 2.28 | 1.17 | | 5.29 | 1.93 |
| 6) Abrasion Test | | | | | | | |
| % Wear | | | - | 25.02 | | - | 23.60 |
| 7) Void % | | | | | | | |
| a) Based on dry loose | | | 38.93 | 32.31 | | 39.90 | 33.99 |
| b) Based on dry rodded | | | 34.04 | 28.68 | | 35.17 | 33.07 |

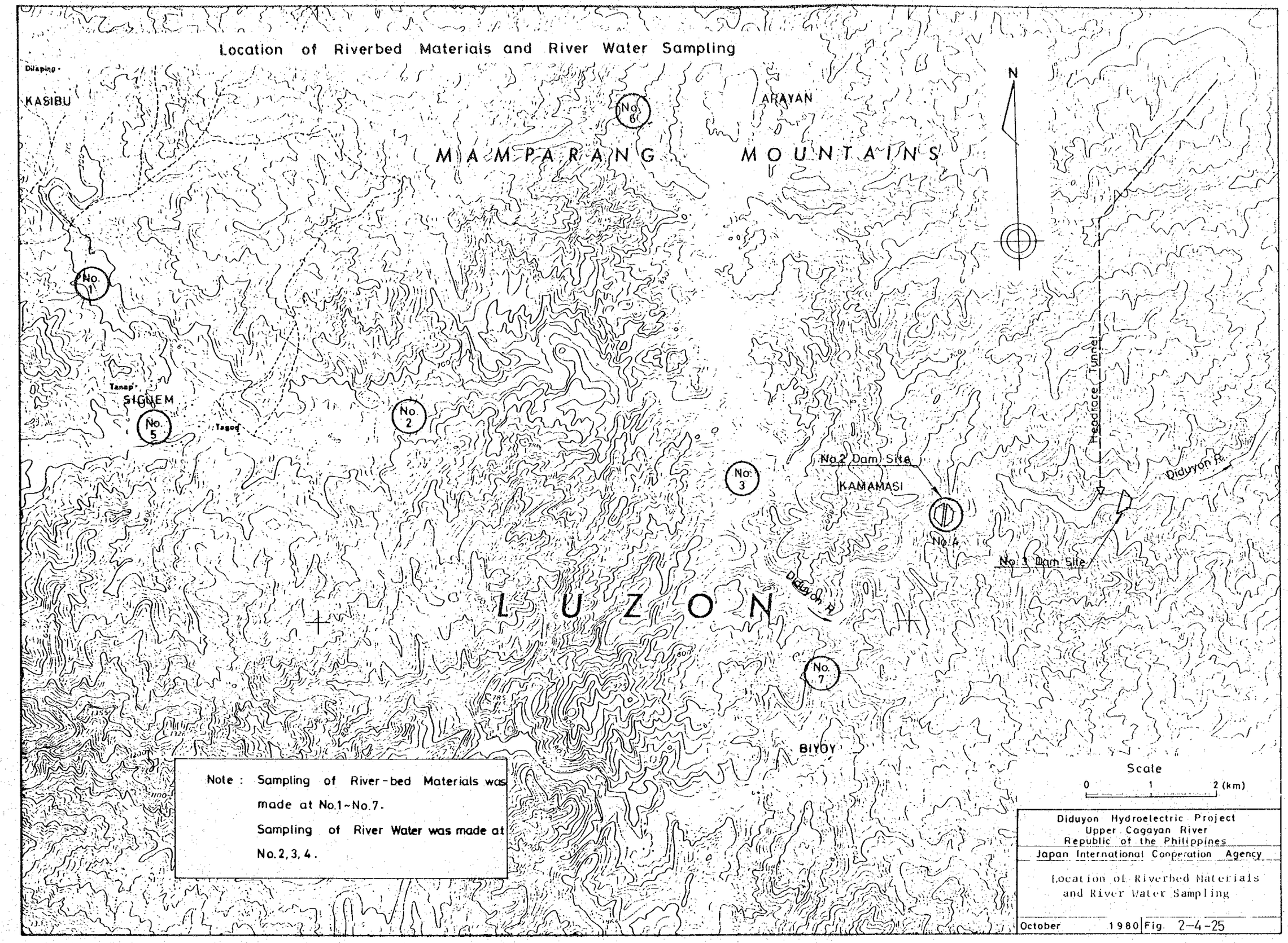
Table 2-4-17 DURATION CURVE(PARALLEL METHOD)

(Damsite No.3)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 365.76 | 62 | 41.07 | 123 | 25.95 | 184 | 20.10 | 245 | 16.33 | 306 | 13.22 |
| 2 | 249.69 | 63 | 40.78 | 124 | 25.67 | 185 | 20.05 | 246 | 16.27 | 307 | 13.14 |
| 3 | 200.67 | 64 | 40.34 | 125 | 25,50 | 186 | 20.05 | 247 | 16.20 | 308 | 13.06 |
| 4 | 176.63 | 65 | 39.76 | 126 | 25.42 | 187 | 19.96 | 248 | 16.16 | 309 | 13.03 |
| 5 | 160.32 | 66 | 39.55 | 127 | 25.37 | 188 | 19.89 | 249 | 16.05 | 310 | 13.02 |
| 6 | 142.56 | 67 | 39.30 | 128 | 25.22 | 189 | 19.81 | 250 | 16.00 | 311 | 12.98 |
| 7 | 136.84 | 68 | 38.95 | 129 | 25.05 | 190 | 19.72 | 251 | 15.97 | 312 | 12.91 |
| 8 | 126.06 | 69 | 38.56 | 130 | 24.94 | 191 | 19.61 | 252 | 15.84 | 313 | 12.87 |
| 9 | 120.83 | 70 | 38.25 | 131 | 24.80 | 192 | 19.56 | 253 | 15.79 | 314 | 12.82 |
| 10 | 116.04 | 71 | 38.00 | 132 | 24.65 | 193 | 19.56 | 254 | 15.73 | 315 | 12.82 |
| 11 | 113.22 | 72 | 37.73 | 133 | 24.53 | 194 | 19.52 | 255 | 15.68 | 316 | 12.80 |
| 12 | 109.58 | 73 | 37.44 | 134 | 24.37 | 195 | 19.41 | 256 | 15.67 | 317 | 12.77 |
| 13 | 104.99 | 74 | 37.08 | 135 | 24.21 | 196 | 19.39 | 257 | 15.62 | 318 | 12.75 |
| 14 | 102.59 | 75 | 36.84 | 136 | 24.10 | 197 | 19.29 | 258 | 15.61 | 319 | 12.72 |
| 15 | 99.00 | 76 | 36.63 | 137 | 24.04 | 198 | 19.22 | 259 | 15.51 | 320 | 12.67 |
| 16 | 95.69 | 77 | 36.33 | 138 | 24.00 | 199 | 19.11 | 260 | 15.42 | 321 | 12.59 |
| 17 | 93.35 | 78 | 36.06 | 139 | 23.85 | 200 | 19.06 | 261 | 15.35 | 322 | 12.56 |
| 18 | 91.67 | 79 | 35.75 | 140 | 23.54 | 201 | 19.01 | 262 | 15.30 | 323 | 12.50 |
| 19 | 89.24 | 80 | 35.44 | 141 | 23.45 | 202 | 18.90 | 263 | 15.27 | 324 | 12.40 |
| 20 | 86.39 | 81 | 35.34 | 142 | 23.34 | 203 | 18.84 | 264 | 15.22 | 325 | 12.35 |
| 21 | 83.28 | 82 | 34.94 | 143 | 23.18 | 204 | 18.80 | 265 | 15.15 | 326 | 12.34 |
| 22 | 81.51 | 83 | 34.63 | 144 | 23.11 | 205 | 18.70 | 266 | 15.09 | 327 | 12.28 |
| 23 | 80.66 | 84 | 34.39 | 145 | 23.06 | 206 | 18.63 | 267 | 15.02 | 328 | 12.24 |
| 24 | 78.64 | 85 | 34.24 | 146 | 22.85 | 207 | 18.56 | 268 | 14.99 | 329 | 12.23 |
| 25 | 77.35 | 86 | 34.07 | 147 | 22.72 | 208 | 18.48 | 269 | 14.93 | 330 | 12.20 |
| 26 | 75.99 | 87 | 33.83 | 148 | 22.72 | 209 | 18.44 | 270 | 14.92 | 331 | 12.13 |
| 27 | 74.71 | 88 | 33.41 | 149 | 22.62 | 210 | 18.34 | 271 | 14.84 | 332 | 12.08 |
| 28 | 74.13 | 89 | 33.17 | 150 | 22.53 | 211 | 18.32 | 272 | 14.75 | 333 | 12.07 |
| 29 | 72.09 | 90 | 32.92 | 151 | 22.52 | 212 | 18.23 | 273 | 14.71 | 334 | 12.02 |
| 30 | 70.66 | 91 | 32.72 | 152 | 22.34 | 213 | 18.20 | 274 | 14.66 | 335 | 12.00 |
| 31 | 68.79 | 92 | 32.50 | 153 | 22.31 | 214 | 18.17 | 275 | 14.58 | 336 | 11.97 |
| 32 | 67.19 | 93 | 32.33 | 154 | 22.21 | 215 | 18.12 | 276 | 14.55 | 337 | 11.88 |
| 33 | 65.21 | 94 | 32.18 | 155 | 22.19 | 216 | 17.95 | 277 | 14.53 | 338 | 11.81 |
| 34 | 63.61 | 95 | 32.00 | 156 | 21.94 | 217 | 17.91 | 278 | 14.52 | 339 | 11.74 |
| 35 | 62.84 | 96 | 31.79 | 157 | 21.84 | 218 | 17.89 | 279 | 14.42 | 340 | 11.70 |
| 36 | 61.94 | 97 | 31.47 | 158 | 21.82 | 219 | 17.82 | 280 | 14.37 | 341 | 11.62 |
| 37 | 61.13 | 98 | 31.16 | 159 | 21.78 | 220 | 17.73 | 281 | 14.33 | 342 | 11.56 |
| 38 | 59.44 | 99 | 30.93 | 160 | 21.73 | 221 | 17.70 | 282 | 14.28 | 343 | 11.50 |
| 39 | 58.39 | 100 | 30.78 | 161 | 21.62 | 222 | 17.60 | 283 | 14.22 | 344 | 11.43 |
| 40 | 57.02 | 101 | 30.52 | 162 | 21.60 | 223 | 17.54 | 284 | 14.17 | 345 | 11.35 |
| 41 | 55.89 | 102 | 30.08 | 163 | 21.56 | 224 | 17.53 | 285 | 14.14 | 346 | 11.28 |
| 42 | 55.21 | 103 | 29.73 | 164 | 21.48 | 225 | 17.47 | 286 | 14.11 | 347 | 11.24 |
| 43 | 54.09 | 104 | 29.43 | 165 | 21.43 | 226 | 17.44 | 287 | 14.05 | 348 | 11.13 |
| 44 | 53.38 | 105 | 29.27 | 166 | 21.36 | 227 | 17.39 | 288 | 13.98 | 349 | 11.07 |
| 45 | 52.54 | 106 | 29.11 | 167 | 21.27 | 228 | 17.36 | 289 | 13.94 | 350 | 11.01 |
| 46 | 51.39 | 107 | 29.00 | 168 | 21.19 | 229 | 17.31 | 290 | 13.90 | 351 | 10.99 |
| 47 | 50.61 | 108 | 28.70 | 169 | 21.18 | 230 | 17.17 | 291 | 13.86 | 352 | 10.87 |
| 48 | 49.85 | 109 | 28.63 | 170 | 21.09 | 231 | 17.12 | 292 | 13.80 | 353 | 10.81 |
| 49 | 49.17 | 110 | 28.47 | 171 | 21.01 | 232 | 16.99 | 293 | 13.75 | 354 | 10.76 |
| 50 | 48.45 | 111 | 28.23 | 172 | 20.94 | 233 | 16.96 | 294 | 13.68 | 355 | 10.68 |
| 51 | 47.89 | 112 | 27.98 | 173 | 20.91 | 234 | 16.94 | 295 | 13.67 | 356 | 10.65 |
| 52 | 47.52 | 113 | 27.71 | 174 | 20.82 | 235 | 16.87 | 296 | 13.66 | 357 | 10.49 |
| 53 | 47.08 | 114 | 27.48 | 175 | 20.75 | 236 | 16.83 | 297 | 13.58 | 358 | 10.46 |
| 54 | 46.29 | 115 | 27.45 | 176 | 20.70 | 237 | 16.74 | 298 | 13.57 | 359 | 10.35 |
| 55 | 45.84 | 116 | 27.29 | 177 | 20.60 | 238 | 16.69 | 299 | 13.56 | 360 | 10.28 |
| 56 | 45.24 | 117 | 27.16 | 178 | 20.53 | 239 | 16.65 | 300 | 13.48 | 361 | 10.18 |
| 57 | 44.37 | 118 | 26.91 | 179 | 20.46 | 240 | 16.60 | 301 | 13.45 | 362 | 10.08 |
| 58 | 43.48 | 119 | 26.71 | 180 | 20.41 | 241 | 16.55 | 302 | 13.33 | 363 | 9.99 |
| 59 | 43.04 | 120 | 26.54 | 181 | 20.33 | 242 | 16.44 | 303 | 13.31 | 364 | 9.76 |
| 60 | 42.61 | 121 | 26.29 | 182 | 20.22 | 243 | 16.37 | 304 | 13.24 | 365 | 9.51 |
| 61 | 41.94 | 122 | 26.21 | 183 | 20.16 | 244 | 16.35 | 305 | 13.24 | | |

Table 2-4-18 Observed Values of Sediment Load

| | Years Recorded | Drainage Area ($km^2$) | Annual Average Discharge ($m^3/sec.$) | Average Annual Sediment Yield ($10^3 m^3$) |
|---|---|---|---|---|
| 1. Agno River, Adoay | 1960 ~ 63 | 246 | 21.9 | 39 |
| 2. Ambuklao | 1950 ~ 52 | 686 | 45.2 | 1,524 |
| 3. Agno River, San Manuel | 59 ~ 63 | 1,225 | 30.0 | 2,963 |
| 4. Ambayoan, Pangasinan | 60 ~ 63 | 281 | 20.2 | 143 |
| 5. Agno River, Rosales, Pangasinan | " | 2,209 | 133.4 | 9,100 |
| 6. Agno River, Bayombong, Pangasinan | 60 ~ 62 | 2,284 | 110.3 | 3,448 |
| 7. Bulsa River, Tarlac | 61 ~ 62 | 405 | 24.0 | 107 |
| 8. Carranglan River, Nueva Ecija | 60 ~ 62 | 258 | 9.9 | 28 |
| 9. Pantabangan, Nueva Ecija | 61 ~ 63 | 253 | 15.3 | 93 |
| 10. Pampanga River, Nueva Ecija | 60 ~ 62 | 828 | 48.2 | 591 |
| 11. Digmala River, Bongabon, Nueva Ecija | " | 52 | 6.0 | 4 |
| 12. Coronel River, Bongabon, Nueva Ecija | 60 ~ 63 | 705 | 48.0 | 467 |
| 13. Talavera River, San Jose, Nueva Ecija | " | 261 | 12.7 | 52 |
| 14. Penaranda River, Nueva Ecija | 53 ~ 61 | 512 | 19.6 | 32 |
| 15. Rio Chico, Sto. Rosario, Nueva Ecija | 61 | 1,177 | 55.2 | 138 |
| 16. Madlum River, San Miguel, Bulacan | 57 ~ 61 | 102 | 4.3 | 13 |
| 17. Pampanga, San Leonardo, Nueva Ecija | 59 ~ 62 | 2,851 | 123.7 | 1,878 |
| 18. Pampanga River, Cabiao, Nueva Ecija | 59 ~ 61 | 3,467 | 118.6 | 1,021 |
| 19. Angat River, Norzagaray | 63 | 568 | 68.2 | 2,528 |


Location of Riverbed Materials and River Water Sampling
KASIBU
Dilaping
ARAYAN
MAMPARANG
MOUNTAINS
N
No. 6
No. 11
Tanap
SIGUEM
No. 5
Tagoc
No. 2
No. 3
No.2 Dam Site
KAMAMASI
No. 4
Headrace Tunnel
Diduyon R.
No.3 Dam Site
LUZON
No. 7
BIYOY
Note : Sampling of River-bed Materials was made at No.1~No.7.
Sampling of River Water was made at No.2, 3, 4.
Scale
0 1 2 (km)
Diduyon Hydroelectric Project
Upper Cagayan River
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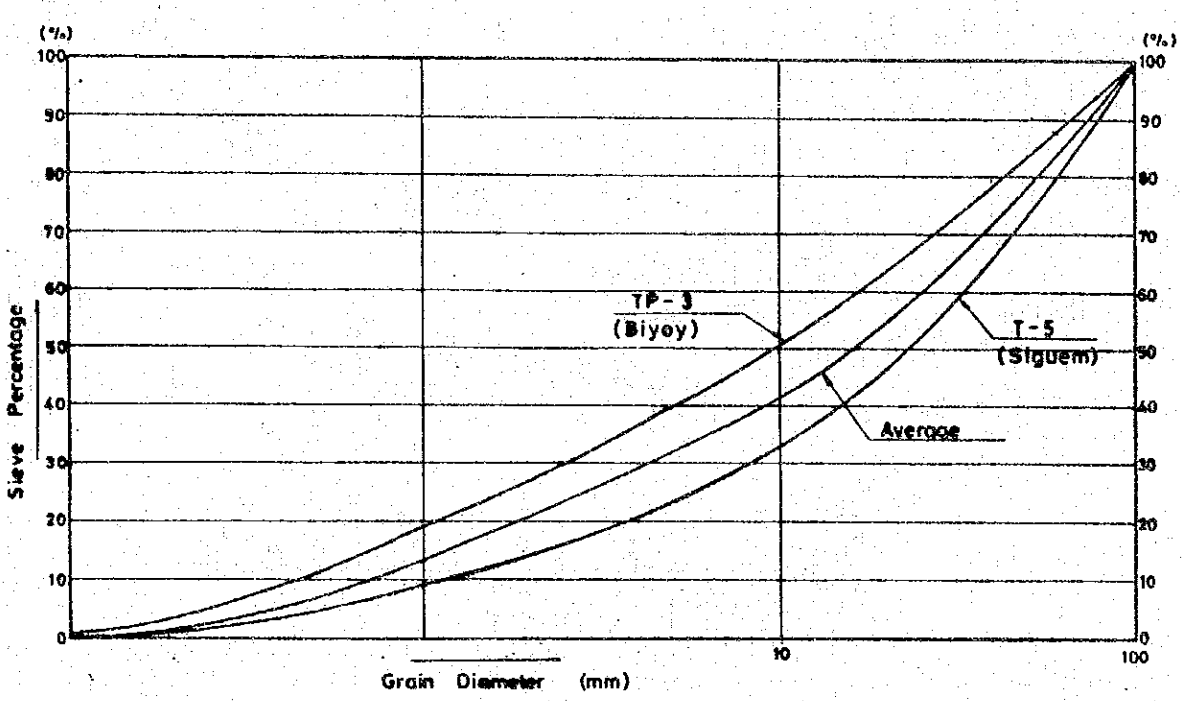
Location of Riverbed Materials and River Water Sampling
October 1980 Fig. 2-4-25

# River Materials, Calssified by Sieve Method




| | |
|---|---|
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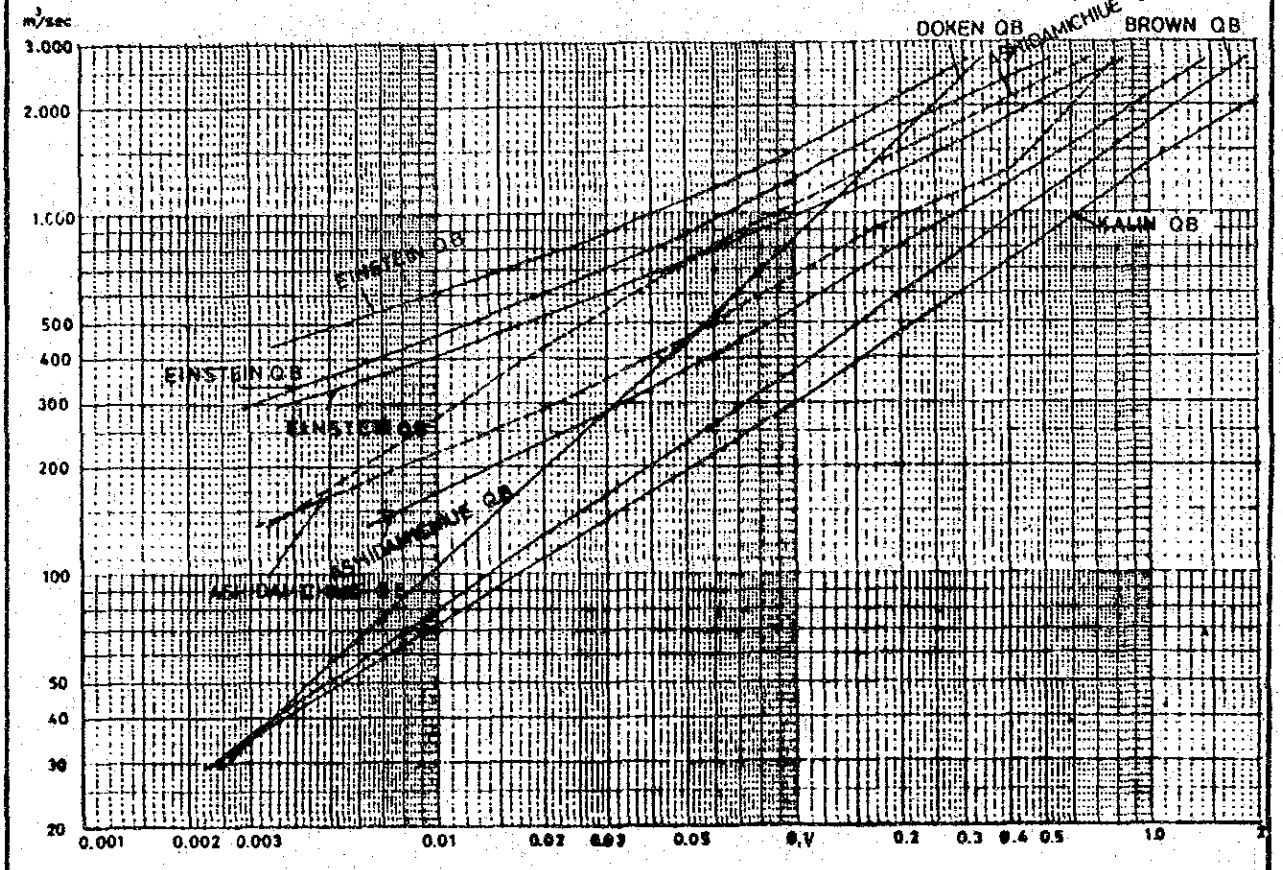
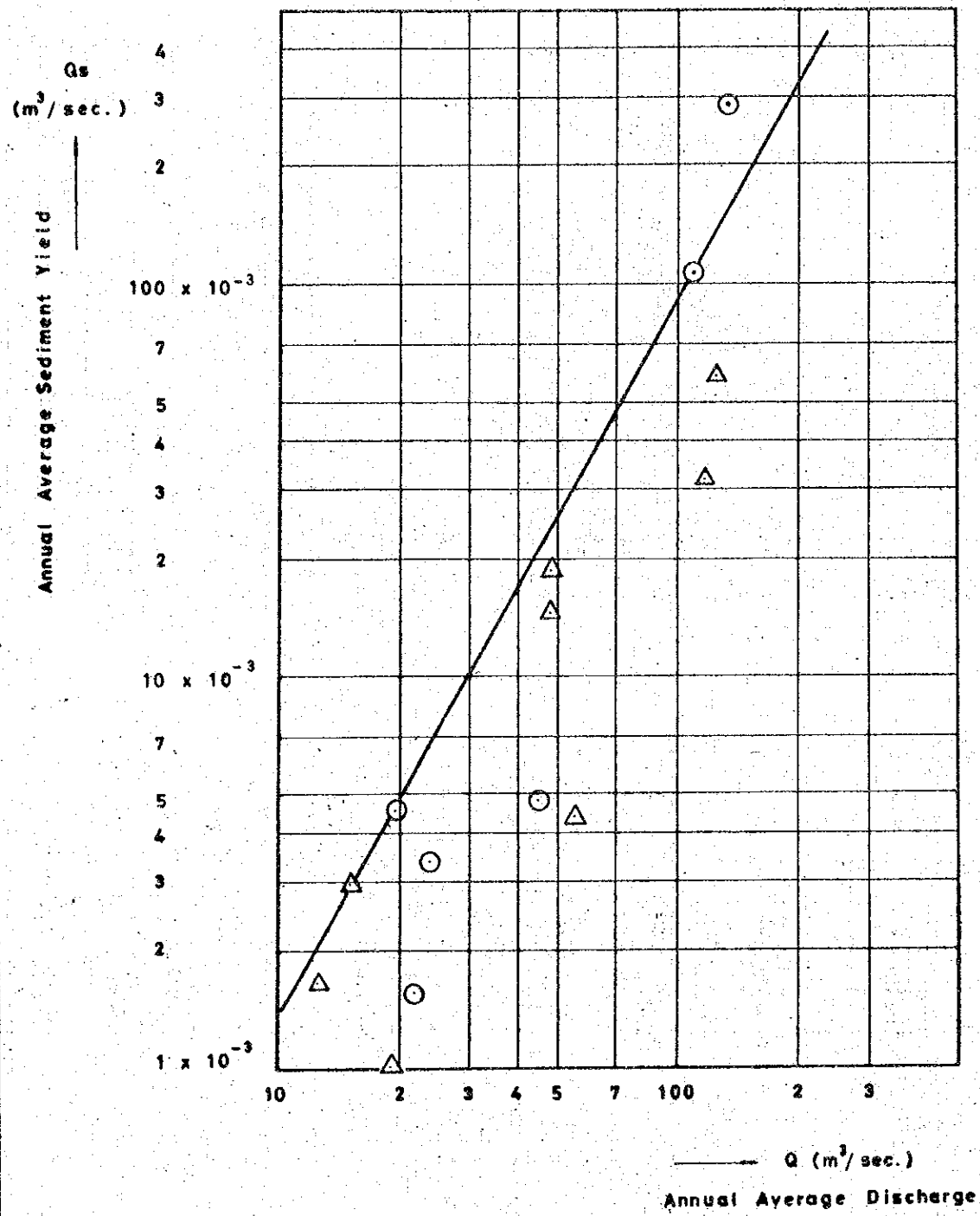
| Japan International Cooperation Agency | |
| River Materials,<br>Classified by Sieve Method | |
| October | 1980 Fig. 2-4-26 |

Sediment Analysis from Riverbed Materials




| | |
|---|---|
| Didyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
| Japan International Cooperation Agency | |
| Sediment Analysis<br>from Riverbed Materials | |
| October 1980 | Fig. 2-4-27 |

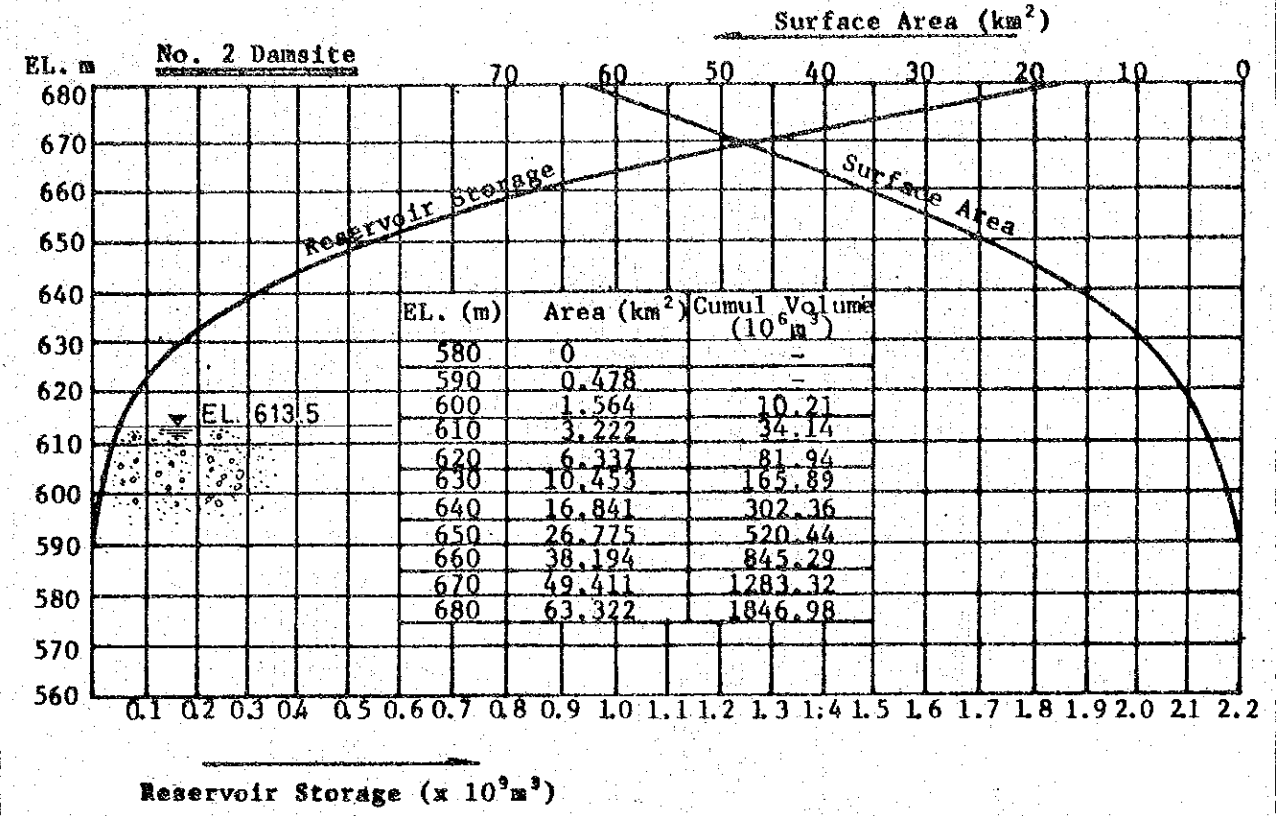
# Relation between Annual Sediment Yield and Annual Average Discharge



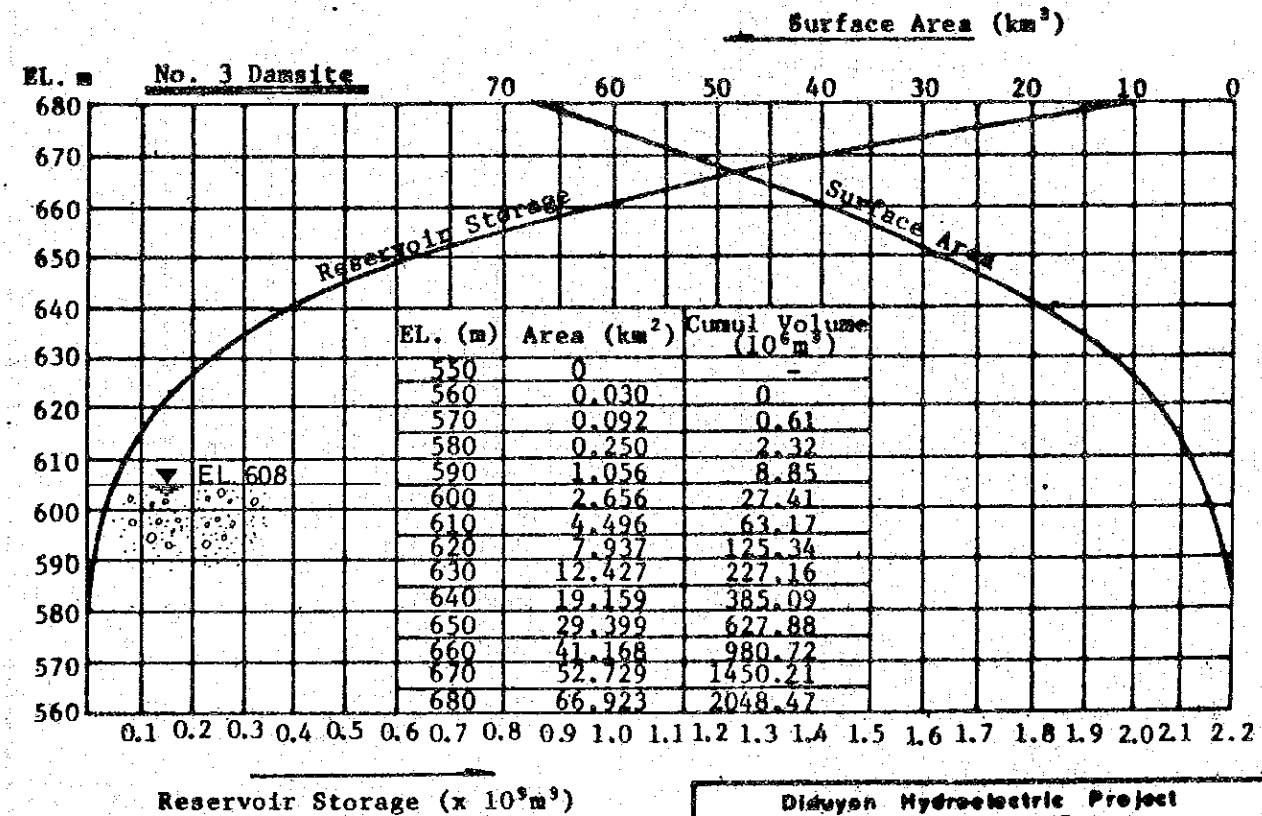

Source : Chico Report
June, 1973

| | |
|---|---|
| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
| Japan International Cooperation Agency | |
| Relation between Annual Sediment Yield and Annual Average Discharge | |
| October | 1980 Fig. 2-4-28 |

# Determined Sedimentation Level of Diduyon Reservoir




| EL. (m) | Area (km²) | Cumul Volume (10⁶m³) |
|---|---|---|
| 580 | 0 | – |
| 590 | 0.478 | – |
| 600 | 1.564 | 10.21 |
| 610 | 3.222 | 34.14 |
| 620 | 6.337 | 81.94 |
| 630 | 10.453 | 165.89 |
| 640 | 16.841 | 302.36 |
| 650 | 26.775 | 520.44 |
| 660 | 38.194 | 845.29 |
| 670 | 49.411 | 1283.32 |
| 680 | 63.322 | 1846.98 |




| EL. (m) | Area (km²) | Cumul Volume (10⁶m³) |
|---|---|---|
| 550 | 0 | – |
| 560 | 0.030 | 0 |
| 570 | 0.092 | 0.61 |
| 580 | 0.250 | 2.32 |
| 590 | 1.056 | 8.85 |
| 600 | 2.656 | 27.41 |
| 610 | 4.496 | 63.17 |
| 620 | 7.937 | 125.34 |
| 630 | 12.427 | 227.16 |
| 640 | 19.159 | 385.09 |
| 650 | 29.399 | 627.88 |
| 660 | 41.168 | 980.72 |
| 670 | 52.729 | 1450.21 |
| 680 | 66.923 | 2048.47 |

Diduyon Hydroelectric Project
Upper Cagayan River
Republic of the Philippines
Japan International Cooperation Agency

Determined Sedimentation Level of Diduyon Reservoir

October 1980 Fig. 2-4-29

## 2.5. Socio-Environmental Aspect and Agriculture

### 2.5.1. Introduction

The environmental assessment for this Project is based on the selected optimum plan of development. Belonging to Region II, the Project is located in the border of Quirino and Nueva Vizcaya Provinces. The power station is sited at Maddela in Quirino Province, while the reservoir dam is located in the Kasibu Manicipality of Nueva Vizcaya Province. The socio-environmental assessment is mainly concerned with the Kasibu Municipality which will be affected by the reservoir. For this objective, the present situation is examined as to Region II and Nueva Vizcaya Province.

### 2.5.2. Location of the Project

(1) Present situation of Region II (Cagayan Valley)

Located in the northeastern part of the Luzon Island, Region II covers an area of 33,800 $km^2$ and has a population of 1.93 million (1975), or 12.1% in area and 4.4% in population of the national totals (Table 2-5-2). The principal city of the Cagayan Valley is Tuguegarao, some 500 km apart from Metro Manila. It takes more than 12 hours to reach there from the Capital by car through National Highway No.5. The remoteness from Manila, and only one land route have caused lagged development of this area. Accordingly, the region is sparsely populated as compared with its area. However, with the consolidation of infrastructures, including the completion of National Highway No.5 and the progress in projects for harnessing the Magat River and the Chico River, the region would become more productive and emerge as an important

source of agricultural products for other populated and consumptive areas such as Metro Manila. The agricultural products are mainly rice, followed by vegetables, fruit and tobacco (Fig. 2-5-1, Table 2-5-3). As evident from Table 2-5-1, the living standard of this region, in terms of both gross income and spending, belongs to the lower category of the whole country. As for the present situation of land exploitation in this area, some 28% is other than mountains or forests. This percentage is much smaller than the national average of 43% (Table 2-5-4). However, by utilizing the abundant riverflow of the Cagayan River, the largest in the Philippines, running across the region, and by cultivating gently sloping hills along the river, potential agricultural development in the future would count high.

(2) Present situation of Nueva Vizcaya Province

Situated at the southern end of Region II, this province is relatively developed as compared with other provinces owing to the location in the region near to Metro Manila. Especially along National Highway No.5, many towns and villages are scattered. Among them are Bayombong where the provincial office is located, Aritao, Bambang, Solano, Bagabag, and Diadi (Fig.2-5-2). All of these communities are densely populated. Though the population of the province in 1970 was 221,965 in statistics but it decreased to 213,151 as of 1975. This is due to the separation of Quirino Province from Nueva Vizcaya Procince. In nation-wide, the population is ranked 58th, accounting for 0.5%. From 1970 to 1975, the rate of population increase was about 23.8%. Table 2-5-5 and 2-5-6 summarise the vital distributions of population in this province. As to the languages used in this region, Ilocano predominates with 66%, followed by Ifugao (12%), Tagalog (5%), and

other various dialects. In each community, the subjects of these dialects are jumbled up. In light of the present situation, it might be concluded that the life of people in this region lacks linguistic integration (Fig. 2-5-3). In guidelines for future development of the country, the Philippine Government places this region as follows:

(i) According to the Physical Planning Strategy, this area is ranked 4th level development priority (see Fig. 2-5-4).

(ii) The allocation of Leading Development Factors cites no reference to this part of the country (see Fig. 2-5-5).

(iii) According to the Land Reform Priority Province, this region belongs to the 3rd priority group (see Fig. 2-5-6).

Fig. 2-5-7 shows programs of consolidating infrastructures for the building of public facilities in this area. Although there are many plans for the construction of roads to facilitate regional development, few are actually in progress. To make these plans more concrete, further efforts are anticipated.

Table 2-5-1 Economic Statistics of Region II as of 1971

| 1971 | | | | | Region |
|---|---|---|---|---|---|
| No. of families (thousand) | Income | | Expenditures | | |
| | Total | Average (Pesos) | Total | Average (Pesos) | |
| 6,437 | 23,714,284 | 3,736 | 28,430,424 | 4,479 | Philippines |
| 525 | 4,085,629 | 7,785 | 4,077,102 | 7,769 | Region I |
| 346 | 1,142,678 | 3,299 | 1,415,641 | 4,087 | Region II |
| 260 | 620,373 | 2,390 | 682,295 | 2,628 | Region III |
| 855 | 3,529,629 | 4,127 | 4,158,065 | 4,862 | Region IV |
| 869 | 3,763,519 | 4,332 | 4,741,639 | 5,458 | Region V |
| 496 | 1,379,438 | 3,784 | 2,013,613 | 4,064 | Region VI |
| 670 | 2,147,428 | 3,206 | 2,586,787 | 3,861 | Region VII |
| 980 | 2,495,547 | 2,548 | 2,941,332 | 3,003 | Region VIII |
| 522 | 1,598,148 | 3,062 | 1,858,567 | 3,561 | Region IX |
| 825 | 2,951,896 | 3,577 | 3,955,382 | 4,793 | Region X |

Regional Grouping

Region I - Manila and Suburbs

Manila, Quezon City, Caloocan City; Pasay City, Makati Mandaluyong; San Juan; Navotas

Region II - Ilocos - Mountain Province

Abra; Ilocos Norte; Ilocos Sur; La Union; Mountain Province

Region III - Cagayan Valley and Batanes

Batanes; Cagayan; Isabela; Nueva Vizcaya

Region IV - Central Luzon

Bataan; Bulacan, Nueva Ecija; Pampanga; Pangasinan; Tarlac; Zambales

Region V - Southern Luzon and Islands

Batangas; Cavite; Laguna; Marinduque, Ossidental Mindoro; Oriental Mindoro, Palawan, Quezon Rizal

Region VI - Bicol

Albay; Camarines Norte, Camarines Sur, Catanduanes, Masbate; Sorsogon

Region VII - Western Visayas

Aklan; Antique; Capiz; Iloilo; Negros Occidental; Rombion

Region VIII - Eastern Visayas

Bohol; Cebu; Leyte; Negros Ortental; Samar; Southern Leyte

Region IX - Northern Mindanao

Agusan; Bukidnon; Lanao del Norte; Lanal del Sur; Misamis Occidental; Misanis Oriental; Surigao del Norte; Surigao del Sur

Region X - Southern Mindanao and Sulu

Cotabato; Davao; Sulu; Zamboanga del Norte; Samboanga del Sur

Source : NEDA Statistical Year Book of the Philippines 1976

Table 2-5-2 **Population and Land Area of Region II, the Philippines**

**(as of 1903 - 1975)**

(Unit:$10^3$ persons,$km^2$,%)

| | Population | | | | | Land Area | | Percentage | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1975 | 1970 | 1960 | 1948 | 1903 | $km^2$ | Total(%) | 1975 | 1970 | 1960 | 1948 | 1903 |
| Philippine | 41,831 | 36,684 | 27,087 | 19,234 | 7,635 | 300,000 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| Region II Total (Cagayan Valley) | 1,826 | 1,690 | 1,202 | 775 | 252 | 338,853 | 11.30 | 4.37 | 4.61 | 4.44 | 4.03 | 3.30 |
| Cagayan | 638 | 581 | 445 | 311 | 148 | 9,002.7 | 3.00 | 1.53 | 1.58 | 1.64 | 1.62 | 1.94 |
| Isabela | 735 | 648 | 448 | 264 | 76 | 10,664.6 | 3.56 | 1.76 | 1.77 | 1.63 | 1.37 | 1.00 |
| kalinga-Apayao | 162 | 136 | 89 | 56 | a | 7,047.6 | 2.35 | 0.39 | 0.37 | 0.33 | 0.29 | a |
| Nueva Vizcaya | 211 | 221 | 138 | 82 | 20 | 3,904.0 | 1.30 | 0.50 | 0.61 | 0.61 | 0.43 | 0.26 |
| Quirino | 65 | - | - | - | - | 3,057.1 | 1.02 | 0.16 | - | - | - | - |
| Batanes | 11 | 11 | 10 | 10 | 8 | 209.3 | 0.07 | 0.03 | 0.03 | 0.04 | 0.06 | 0.10 |

Source : Philippine Almanac and Handbook Facts 1977

Table 2-5-3 Agricultural Production of Region II, the Philippines (1973, 1975, 2000)

Source: Technical Report, Agriculture and Natural Resource Development in the Philippines, Part I-Crops

| | PALAY | CORN | VEGETABLES | FRUITS | SUGAR CANE | COCONUT | TOBACCO | VIRGINIA TOBACCO | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| PHILIPPINES | | | | | | | | | |
| 1973 | 2,742,024 | 1,027,046 | | | 434,733 | 2,125,600 | 45,730 | 31,910 | 5,407,693 |
| 1975 | 2,700,893 | 1,007,800 | 76,849 | 510,546 | 447,733 | 2,105,600 | 45,730 | 31,910 | 6,949,061 |
| 2000 | 2,222,806 | 882,895 | 297,726 | 401,601 | 511,046 | 2,125,600 | 45,730 | 31,910 | 6,619,314 |
| REGION II | | | | | | | | | |
| 1973 | 265,935 | 156,503 | | | 0 | 5,253 | 20,160 | 1,320 | 449,161 |
| 1975 | 261,241 | 153,988 | 6,768 | 22,183 | 0 | 5,253 | 20,160 | 1,320 | 470,913 |
| 2000 | 202,700 | 140,853 | 15,124 | 14,030 | 0 | 5,253 | 20,160 | 1,320 | 399,440 |
| Percentage | (9.70%) | (15.24%) | | | | (0.25%) | (44.08%) | (4.14%) | (7.01%) |
| | (9.67%) | (15.28%) | (8.81%) | (4.34%) | | (0.25%) | (44.08%) | (4.14%) | (6.78%) |
| | (8.73%) | (15.95%) | (5.08%) | (3.49%) | | (0.25%) | (44.08%) | (4.14%) | (6.21%) |

Table 2-5-4 **Status of Land Classified by Regions**

As of June 30, 1974

(unit: ha)

Source : NEDA Statistical Year Book of the Philippines, 1976

| Region | Alienable & Disposable | Public Forest | | | | | | | | Area of Region |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Timber Land | | | | | | Unclassified Public Forest | Total | |
| | | Timber Land | Forest Reserve | National Park | Reservation | | TOTAL | | | |
| | | | | | Military & Naval | Civil | | | | |
| Philippine | 12,917,083 | 5,555,038 | 2,898,655 | 227,914 | 103,011 | 252,524 | 9,064,142 | 8,018,776 | 17,082,917 | 30,000,000 |
| Region I | 906,166 | 71,622 | 569,717 | 28,268 | 842 | 65,580 | 736,029 | 514,650 | 1,250,679 | 2,156,845 |
| Region II | 1,012,535 | 676,969 | 515,893 | 1,039 | 412 | - | 1,195,313 | 1,432,453 | 2,627,765 | 3,640,300 |
| Region III | 1,005,568 | 187,977 | 140,184 | 32,806 | 116,600 | 60,453 | 538,020 | 284,197 | 822,217 | 1,827,785 |
| Region IV | 1,859,651 | 905,753 | 285,350 | 18,324 | 3,935 | 65,925 | 1,279,287 | 1,612,376 | 2,891,663 | 4,751,314 |
| Region V | 1,204,859 | 377,740 | 63,843 | 24,858 | - | - | 466,441 | 91,949 | 558,390 | 1,763,249 |
| Region VI | 1,311,305 | 330,709 | 95,785 | 28,992 | - | 201 | 455,687 | 255,319 | 711,006 | 2,022,311 |
| Region VII | 803,929 | 322,573 | 57,220 | 18,035 | 4 | 9 | 397,841 | 293,372 | 691,213 | 1,495,142 |
| Region VIII | 948,033 | 258,936 | 51,144 | 2,111 | 176 | - | 312,367 | 882,769 | 1,195,136 | 2,143,169 |
| Region IX | 979,546 | 299,465 | 428,379 | 6,674 | 46 | - | 734,564 | 348,336 | 1,082,900 | 2,062,446 |
| Region X | 1,271,086 | 916,969 | 407,328 | 57 | 7,996 | - | 1,332,350 | 1,187,115 | 2,519,465 | 3,790,551 |
| Region XI | 1,641,405 | 1,206,325 | 282,812 | 66,750 | - | 60,356 | 1,616,243 | 1,116,240 | 2,732,483 | 4,346,888 |
| Percentage Distribution | | | | | | | | | | |
| Philippine | 43.1 | 18.5 | 9.7 | 0.8 | 0.4 | 0.8 | 30.2 | 26.7 | 56.9 | 100.0 |
| Region II | 27.8 | 18.6 | 14.2 | 0.0 | 0.0 | - | 32.8 | 39.4 | 72.2 | 100.0 |

Table 2-5-5 Urban-Rural Population, Nueva Vizcaya P.V. : 1970 and 1975

| Residence and Sex | 1975 | | 1970 | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Both Sexes | 213,151 | 100.0 | 172,198 | 100.0 |
| Urban | 34,627 | 16.2 | 43,267 | 25.1 |
| Rural | 178,524 | 83.8 | 128,931 | 74.9 |
| Male | 109,022 | 100.0 | 86,995 | 100.0 |
| Urban | 17,169 | 15.9 | 21,351 | 24.5 |
| Rural | 90,853 | 84.1 | 65,644 | 75.5 |
| Female | 105,129 | 100.0 | 85,203 | 100.0 |
| Urban | 17,458 | 16.6 | 21,916 | 25.7 |
| Rural | 87,671 | 83.4 | 63,287 | 74.3 |

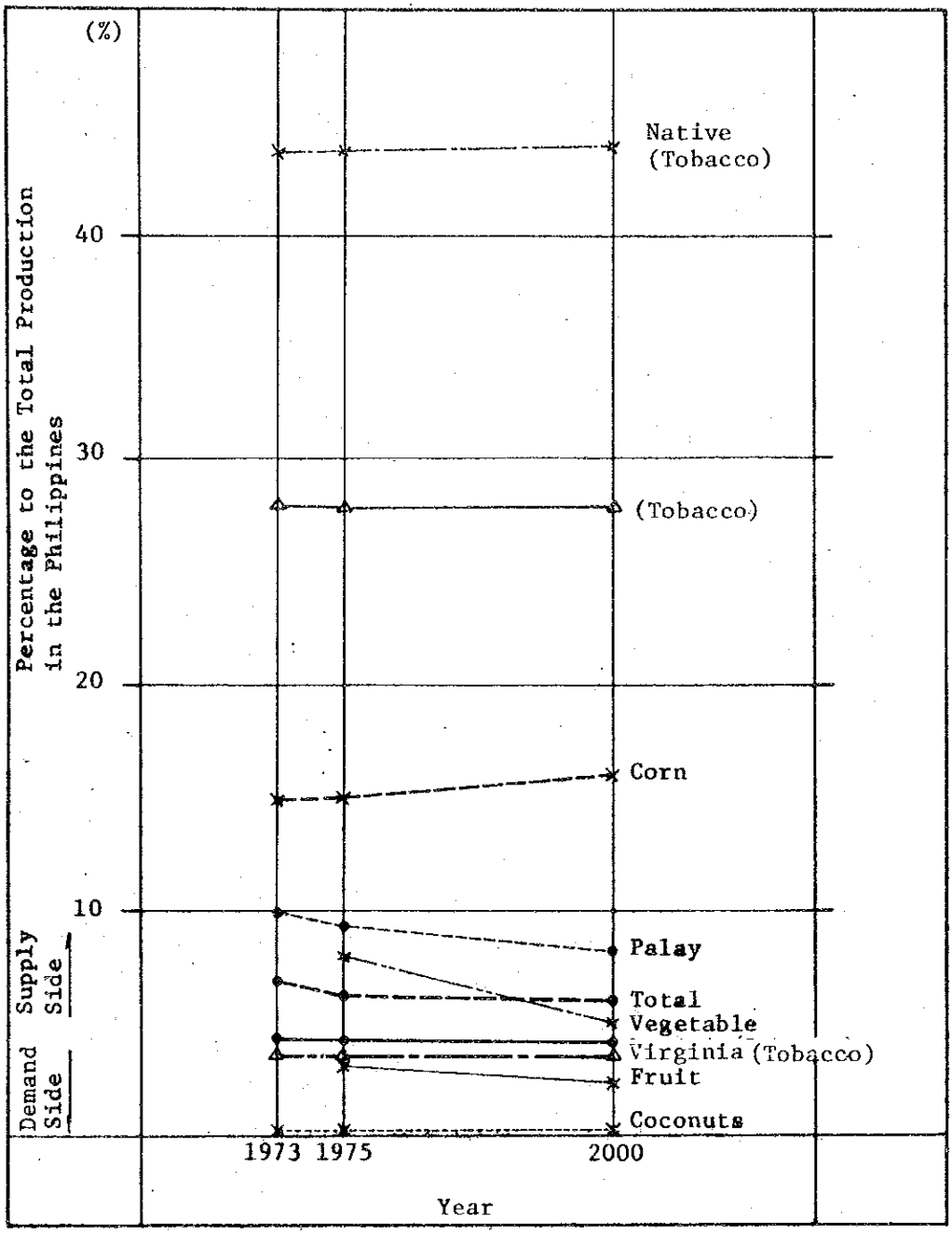
Source : 1975 Integrated Census of the Population and Its Economics Activities (Population Nueva Vizcaya) : NEDA

Table 2-5-6 **Population 10 Years Old and Over, by Major Gainful Occupation, Nueva Vizcaya: 1970 and 1975**

| | 1975 | | 1970 | |
|---|---|---|---|---|
| | Number | Percent | Number | Percent |
| Total | 62,971 | 100.0 | 54,639 | 100.0 |
| Farmers, fishermen, hunters, loggers and related workers | 42,845 | 68.0 | 38,027 | 69.6 |
| Craftmen, production process workers and related laborers | 4,542 | 7.3 | 3,967 | 7.3 |
| Sales workers | 3,542 | 5.6 | 2,157 | 4.0 |
| Professional, technical and related workers | 3.095 | 5.0 | 3,041 | 5.6 |
| Service, sports and related workers | 2,803 | 4.4 | 2,886 | 5.3 |
| Workers in transport and communications | 2,317 | 3.7 | 1,812 | 3.3 |
| Clerical workers | 1,394 | 2.2 | 1,012 | 1.8 |
| Stevedores &related freight handlers and laborers, n.e.c. | 992 | 1.6 | 901 | 1.6 |
| Administrative, executive, and managerial workers | 675 | 1.1 | 195 | 0.4 |
| Others n.e.c., and occupations unidentifiable | 727 | 1.1 | 641 | 1.1 |

Source : 1975 Integrated Census of the Population and Its Economics Activities (Population Nueva Vizcaya) :

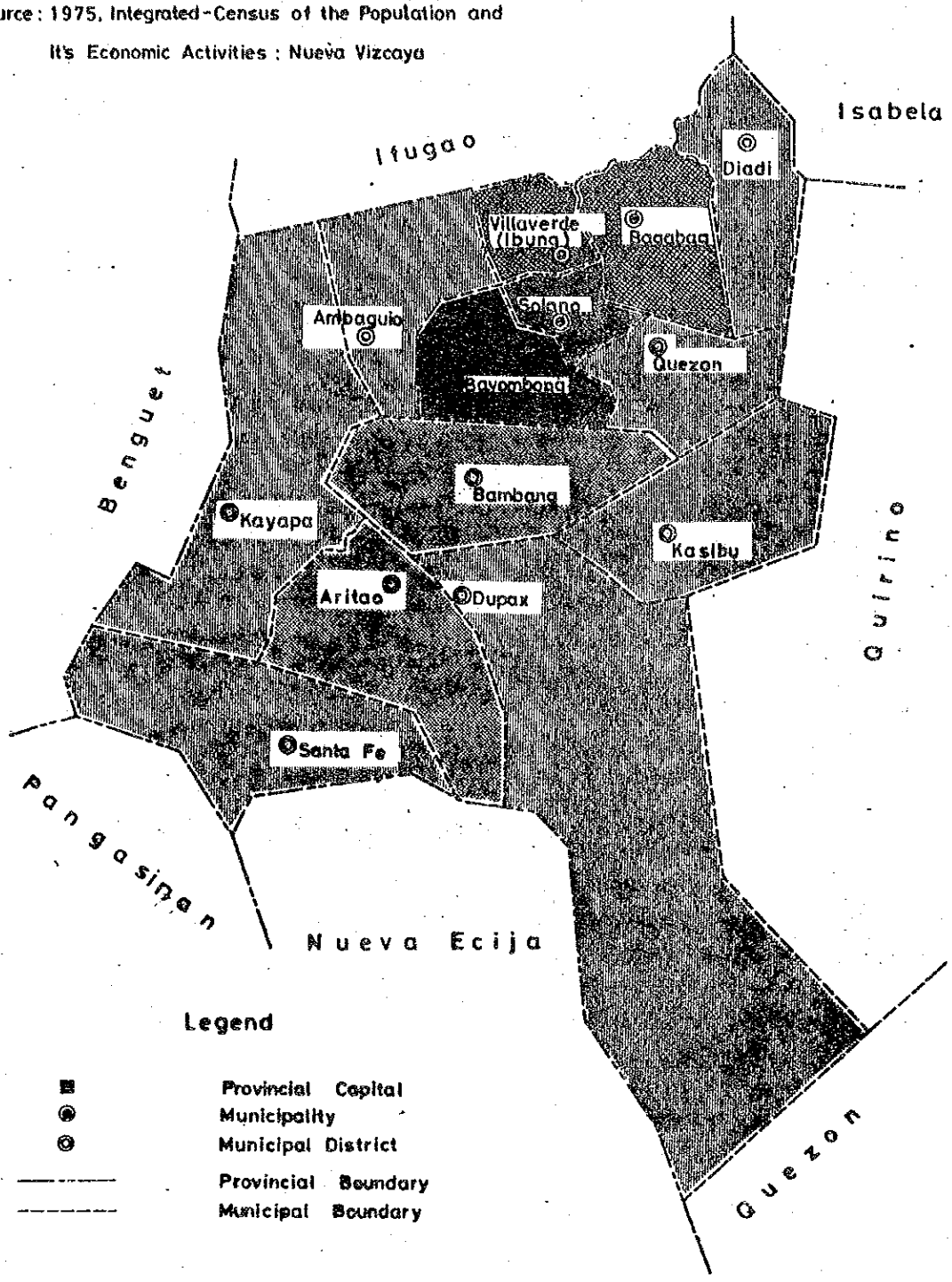
## Estimated Demand and Supply of Agricultural Products in Region II




| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
|---|---|
| Japan International Cooperation Agency | |
| Estimated Demand and Supply of Agricultural Products in Region II | |
| October 1980 | Fig. 2-5-1 |

# Population Density by Municipality
## (Nueva Vizcaya, 1975)

Source : 1975, Integrated-Census of the Population and
It's Economic Activities : Nueva Vizcaya




Legend

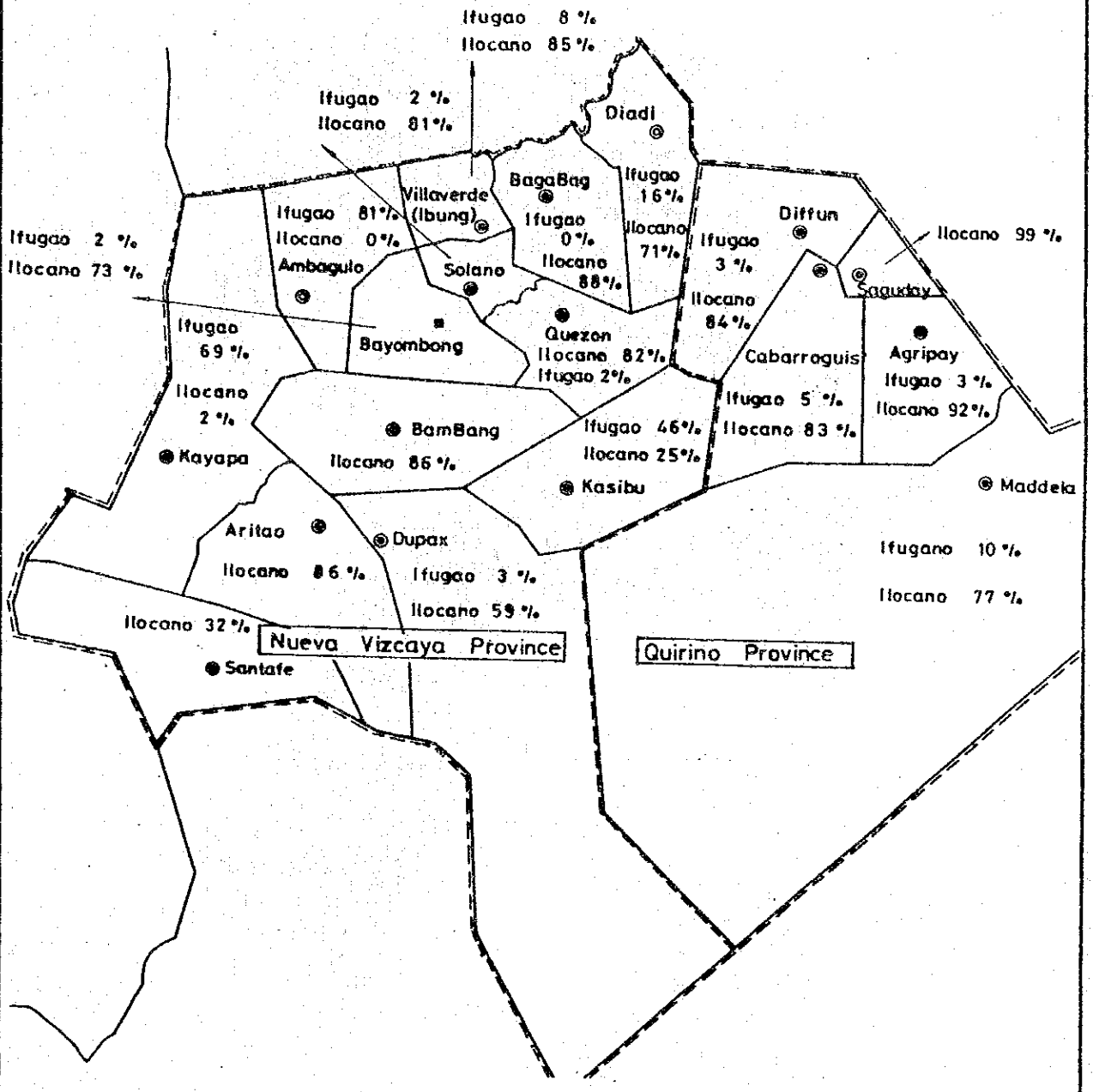
- Provincial Capital
- Municipality
- Municipal District
- Provincial Boundary
- Municipal Boundary

Population Density
Per Square Kilometer

- 150 and over
- 100 to 149
- 50 to 99
- 0 to 49

| | |
|---|---|
| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
| Japan International Cooperation Agency | |
| Population Density by Municipality | |
| October 1980 | Fig. 2-5-2 |

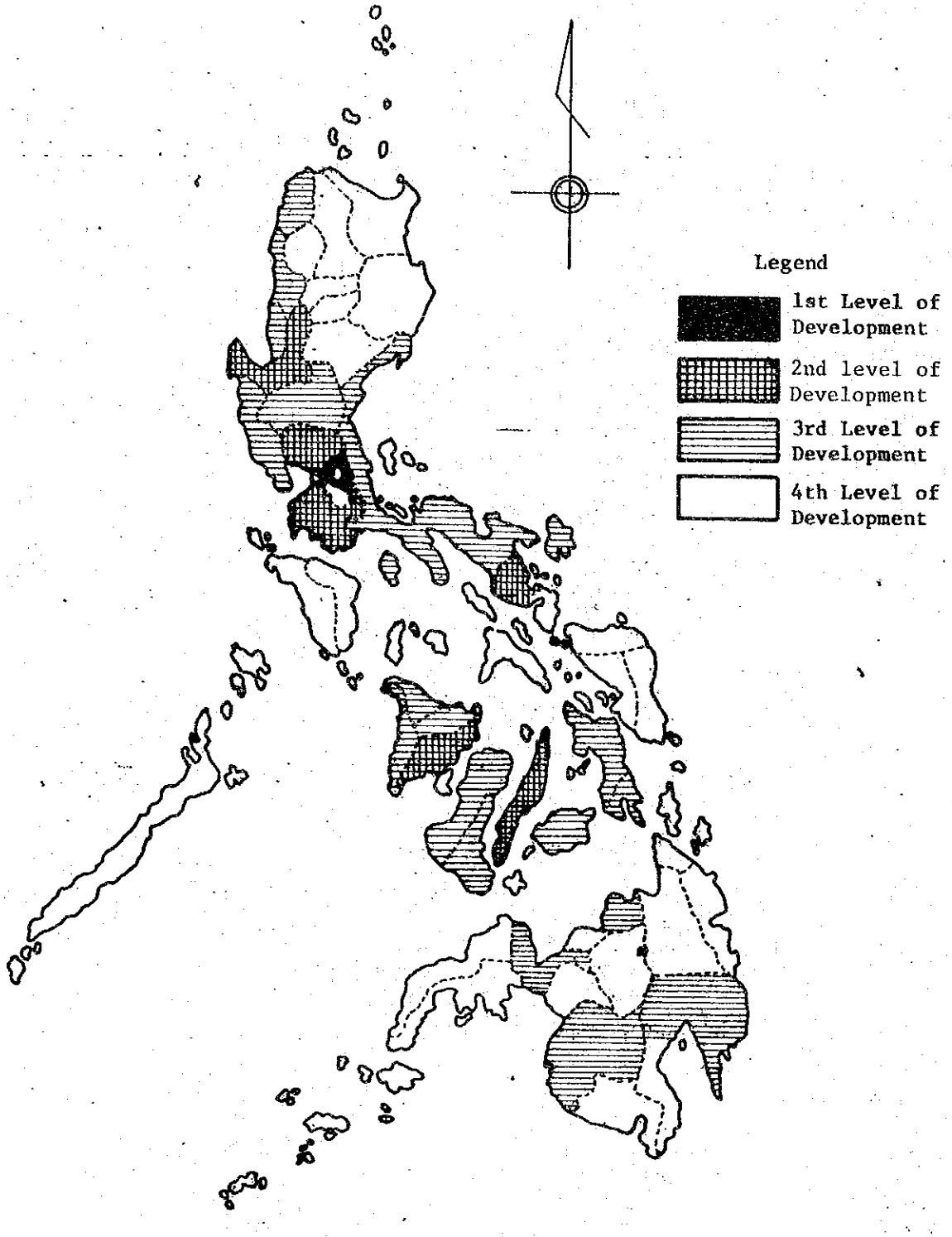
Dealects Spoken in Nueva Vizcaya Province




Source: 1970 Census of Population and Housing: Nueva Vizcaya

| Diduyan Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
|---|---|
| Japan International Cooperation Agency | |
| Dialects Spoken in Nueva Vizcaya Province | |
| October | 1980 Fig. 2-5-3 |

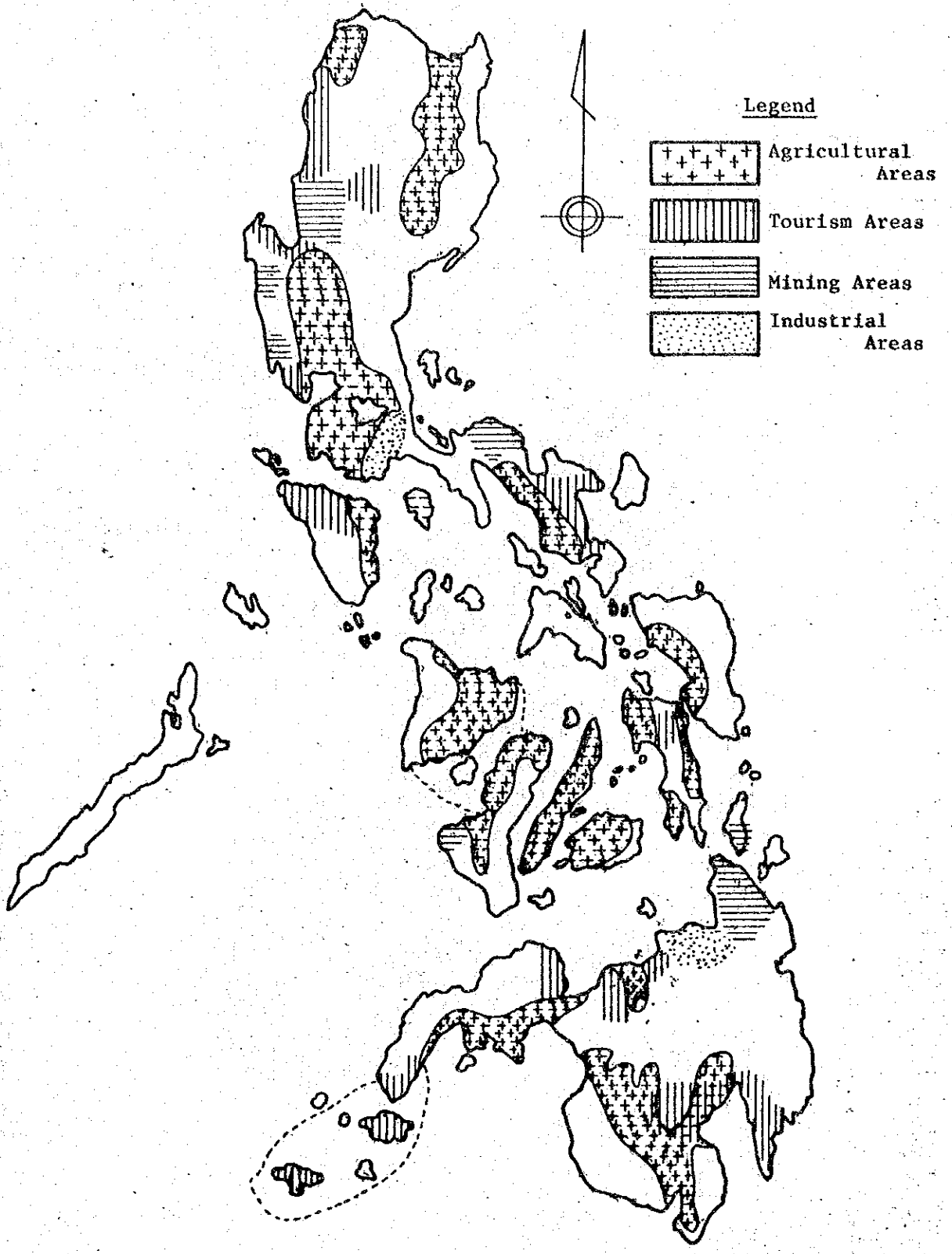
## Physical Planning Strategy for the Philippines




Source: Regional Development Project, FY. 1974 - 77
: Neda

| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
|---|---|
| Japan International Cooperation Agency | |
| Physical Planning Strategy for the Philippines | |
| October 1980 | Fig. 2-5-4 |

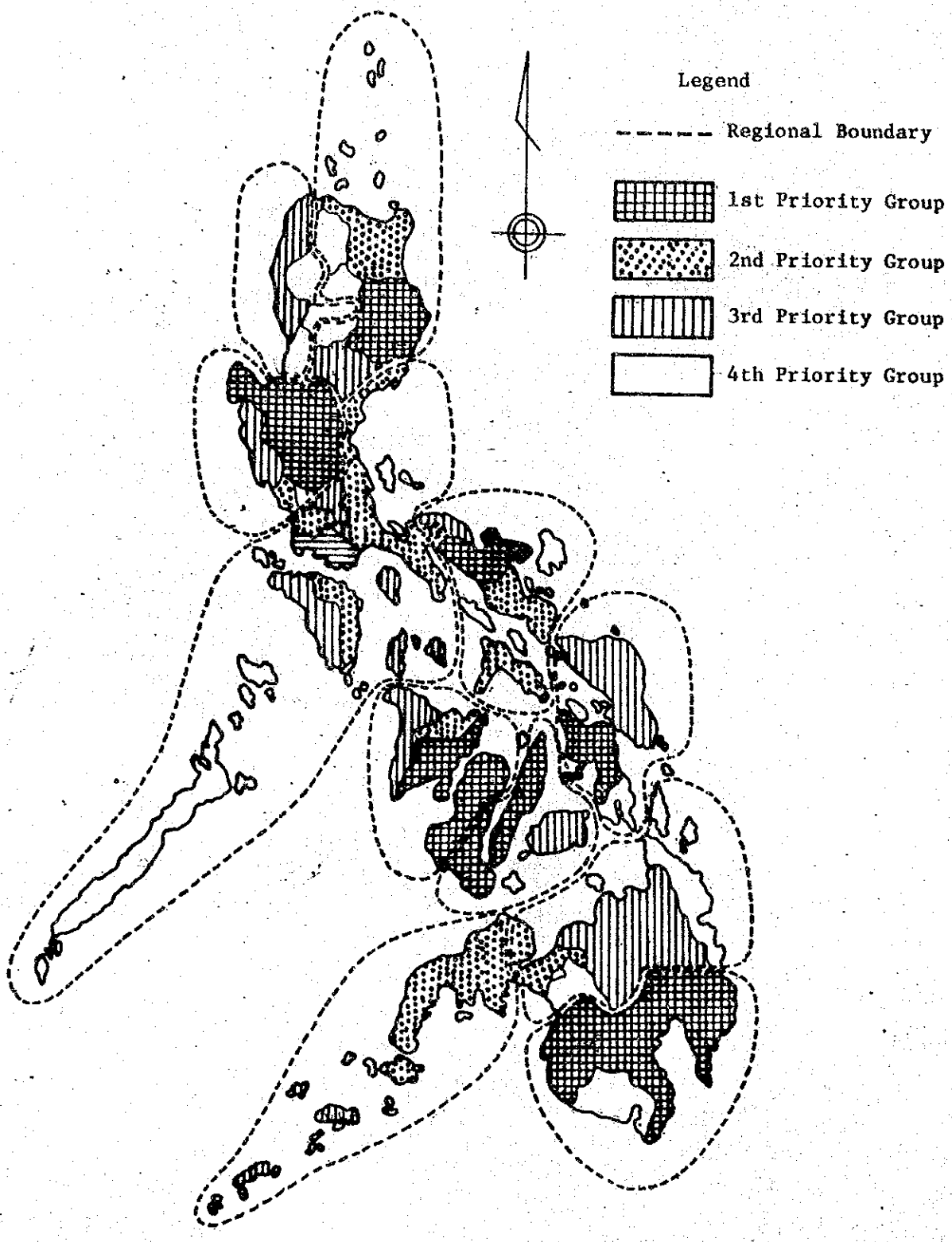
## Allocation of Leading Development Factors




Source: Regional Development Project, FY.1974-77 : Neda

| | |
|---|---|
| Diduyon Hydroelectric Project Upper Cagayan River, Republic of the Philippines | |
| Japan International Cooperation Agency | |
| Allocation of Leading Development Factors | |
| October 1980 | Fig. 2-5-5 |

## Land Reform Priority by Provinces

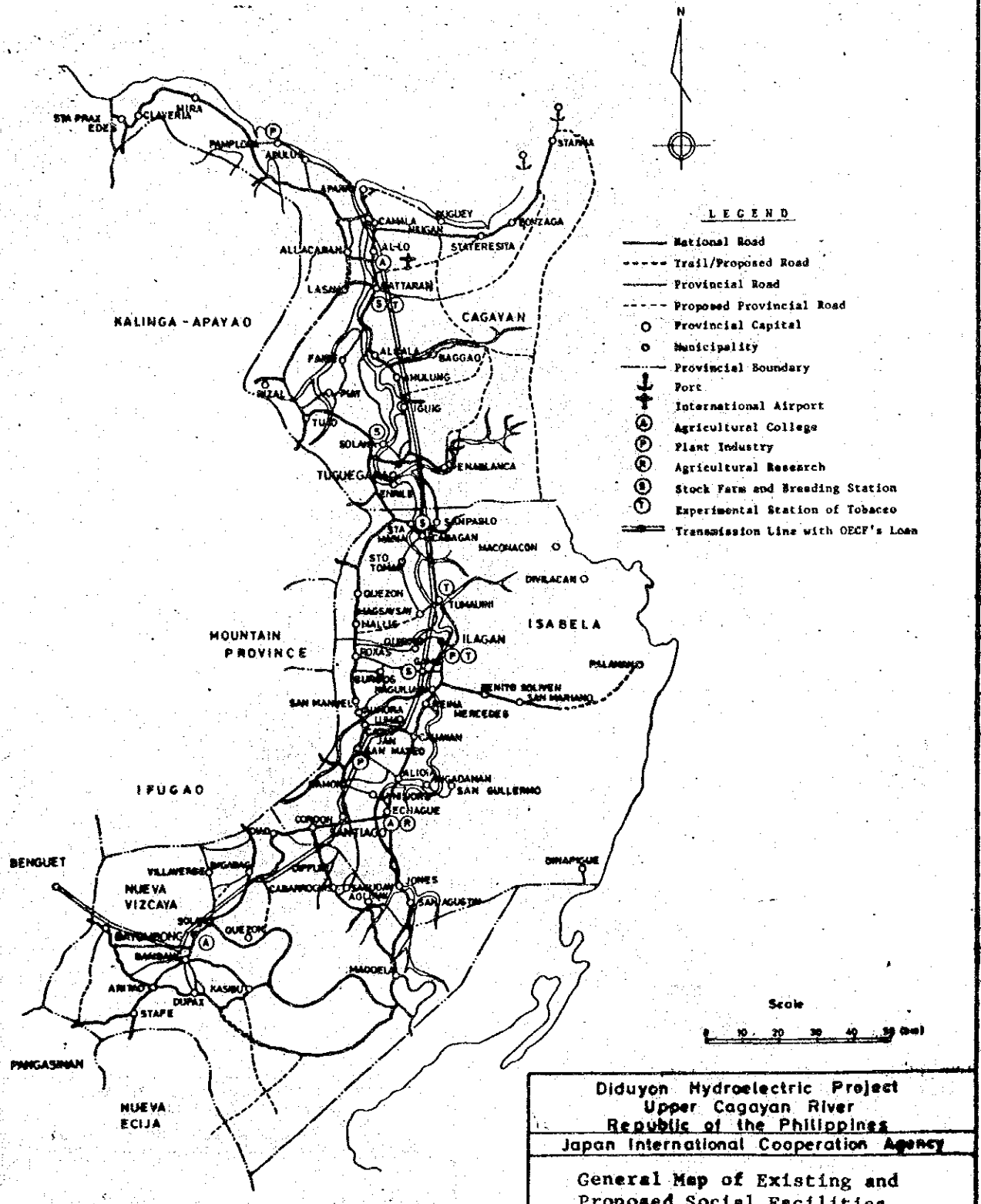



Source : Regional Development Project, FY 1974-77 : Neda

| |
|---|
| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines |
| Japan International Cooperation Agency |
| Land Reform Priority by Provinces |
| October 1980 Fig. 2-5-6 |

# General Map of Existing and Proposed Social Facilities by the Government

Source : D.P.H.




| | |
|---|---|
| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
| Japan International Cooperation Agency | |
| General Map of Existing and Proposed Social Facilities by the Government | |
| October 1980 | Fig. |

## 2.5.3. Present Situation of Natural Environment

### (1) Brief description of the site

Since 1972, the proposed damsite has been under the jurisdiction of the Maddela Municipality of Quirino Province. Before that, it belonged to the administrative district of the Kasibu Municipality of Nueva Vizcaya Province, and it is still under the influence, in terms of both administration and economy, of the Kasibu Municipality. For this reason, surveys of natural and social environments are focused on the Kasibu Municipality a part of which will be affected by the construction of the dam. Situated of the eastern end of Nueva Vizcaya Province, the Kasibu Municipality adjoins the municipalities of Quezon, Bambang, and Dupax on the north, west, and south, and Quirino Province on the east (see Fig.2-5-2). Located at EL 650 to 750 m above sea-level, the Kasibu village communities are surrounded by the mountains of Mamparang and Caraballo , soaring as high as EL 1,000 m to 1,300 m. The Kasibu villages are scattered on the hills along the banks of the upper reaches of the Diduyon River and of several streams and creeks flowing into the river. Rice paddies are spread over the lowland of hills along the river and streams. Farms fields are found on the terrace below the weedy hillside. Steeply sloping places are forested. Village communities are usually located at places slightly elevated above the farm land.

### (2) Physical Environment

1) Meteorology
2) Hydrology

are described in other chapters and sections of Vol.I and Vol.II.

3) Water quality

Table 2-5-7 shows the quality of water sampled at Aglipay, a lower reach of the Diduyon River. Although no data

was obtained as to the amount of dissolved oxygen (DO), suspended solids (SS) and biochemical oxygen demand (BOD) which could be used as indexes for determining the degree of water pollution, the quality of the river water is considered to be similar to that of Japan. Compared with other rivers in the Philippines (the Abulug, for example), the degree of pollution is high due to contamination with earth and sand.

(3) Biological environment

1) Terrestrical biological environment

(1) Vegetation

By their formation, the forests of the Philippines are classified into six groups (Table 2-5-8). The forests in the surveyed area belong to Groups 1, 2 and 6. On the periphery of villages around Kasibu, the mountains are considered to be covered with the forest classified as Group 1 with the exception of some hills near the river. Table 2-5-9 summarizes the composition of woodland trees. According to hearings at the site, there are lauan, apitotoug, mayapis, pine, narra, ipil, etc. The trees listed in Table 2-5-10 are all important forest resources. It must be noted that the felling and export of these trees are prohibited. A survey of vegetation is currently under way in all the territory of the Philippines. Detailed information may be obtained from the results of this survey.

(2) Animal life

As in the case of vegetation, no investigation has ever been conducted on the local wildlife but one done for Northern Luzon by John Whitehead, whose

data was examined by Thomas. Among the names of large mammals heard of during this survey are monkey, wild pig and wild deer. Beside these, the existence of rattle snakes and small crocodiles was also confirmed by hearings. From among 54 species of the feathered tribe said to live on Luzon Island are kalao, Philippine eagle, King fisher, parrot, mountain dove, maya and wild duck (Table 2-5-11).

2) Aquatic biological environment

Some 2,000 kinds of fish are said to live in the seas around the many islands which compose the Philippine Archipelago. As for fresh-water fish, no particular survey other those associated with certain projects seems to have been undertaken on the rivers in the northern half of Luzon Island, though some are known to live in the lakes of Southern Luzon. According to the Bureau of Fisheries for Region II, the kinds of fish listed in Table 2-5-12 are those living in the Cagayan River. Of the species shown in the table, eel and mullet are ascending migratory fishes. In addition to shrimp the five names of the finned tribe heard at the site of the survey. These are mudfish, catfish, eel, tilapia and carp. Concerning mullet, which is one of the primary species in the Cagayan River, hearings failed to confirm whether it had already ascended to reach the vicinity of the project site in Kasibu. Virtually no shellfish are said to exist in the area. Since no biological survey has been conducted, it may be inappropriate to place any conclusions at this moment, however, as far as heard from the above agency and local residents, no fish living in the Upper Cagayan are of any particular species subject to protection or conservation. No investigation was made as to the duckweed and the life groveling on the riverbed.

Table 2-5-7 Water Quality Test Sheet

Analysis Report

Sample/Source : Diduyon River
Date Sampled : July 28, 1978
Analyzed: August 2, 1978

| Items | | PPM as | No. |
|---|---|---|---|
| Color | | | Yellowish |
| Odor | | | None |
| Appearance | | | Turbid |
| Turbidity(after shaking) | | $SiO_2$ | 8.5 |
| pH @25°C | | | 7.8 |
| Conductivity @25°C | | ms/cm | 1,590 |
| Total Hardness | | $CaCO_3$ | 69.59 |
| P-Alkalinity | | $CaCO_3$ | 0 |
| MO-Alkalinity | | $CaCO_3$ | 22.80 |
| Total Solids | | | |
| Others Total Iron pp | | | 0.17 |
| Total Phosphate T.P. | | $PO_4$ | 0.015 |
| | | | |
| Cations | Calcium | $CaCO_3$ | 50.40 |
| | Magnesium | $CaCO_3$ | 39.10 |
| | Sodium + Potassium | $CaCO_3$ | 40.50 |
| Anions | Bicarbonates | $CaCO_3$ | 22.80 |
| | Carbonates | $CaCO_3$ | 0 |
| | Sulfates | $CaCO_3$ | 24.5 |
| | Chlarides | $CaCO_3$ | 62.7 |
| | ClO | $CaCO_3$ | 35.58 |
| | | | |
| | | | |
| | | | |

Tested by: BTPP Chemists Verified by: P.T. Fajardo

Concurred: Jose C. M. Lidiran

Source: Annual Report, Calendar Year 1977
Regional Health Office No.2

## Table 2-5-8 Type of Trees in the Philippines

1) Dipterocarp or Lauan Type

This is a peculiar type to tropical zone, which is composed of the varieties of tree and regarded important to forest industries. Its typical kinds of tree are listed below:

lauans; tanguile (Shorea polysperma), mayapis (Shorea squamata) Yakal (Shorea astylosa), apitong (Diptero carpus spp), guijo (Shorea guiso) (S. malibato, S. seminis, S. ciliata)

2) Molave or Molawin Type

This type of forest appears around dry limestone area and consists of the following trees:

molave (Vitex partiflora), narra (Pterocarpus indicus), tin daro (Afzelia rhompoidea), ipil (Intsia bijuga), akle (Serialbizia acle), banuyo (Wallaceodendron elebicum)

3) Pine or Saleng Type

The pine forests are often seen in the mountain ranges of high altitude in northern Luzon. A main species of tree is Benquet pine.

4) Mangrove or Bakawan Type

This group grows near the river month. Trees are utilized as fuel, dyes, etc. Important kinds of trees are as follows:

bakauan (Rhizophora spp.), busaing (Bruguiegra gymnorrhiza), pototan (Bruguiera sexangula, B. Cylimdrica), langarai (Bruguiera parviflora), tangal (Ceriops tangal)

5) Beach Type

Most of the trees in this forest usually developing along the shorelines is pandanus which includes:

talisai (Terminalia catappa), dapdap (Erythriua orientalis), Agoho (Casuarina equisetifolia)

6) Mid-mountain and moss type

This type is considered most important for preservation. The trees grow on steep slopes with less soil, often attached with moss. Major kinds are as follows:

lokinai (Dacrydium elatum), igem (Podocarpus imbricatus)

Table 2-5-9 Components of Trees of Type - I in the Philippines

| Name of Tree | Percentage |
|---|---|
| White lauan (Pentacme contorta, P. Mindanensis) | 19.52 |
| Apitoug (Dipterocarps spp.) | 12.36 |
| Tanguile (Shorea polysperma) | 9.47 |
| Mayapis (Shorea squamata) | 9.11 |
| Red lauan (Shorea negrosensis) | 8.76 |
| Guijo (Shorea guiso) | 5.06 |
| Yakal (Shorea astylosa, S. malibato, S. semiuis, S. ciliata) | 3.51 |
| Benquet pine | 2.30 |
| Manggachapuri (Hopea acuminata, H. foxworthyi) | 2.05 |
| Palosapis (Anisoptera thurifera, A. Mindanensis) | 1.32 |
| Narra (Pferocarpus spp.) | 1.18 |
| Almon (Shorea almon) | 1.11 |
| Others | 25.36 |
| Total | 100.00 |

Note: Percentages are shown in volume as timber.

Table 2-5-10 Some Special Tree Species in the Philippines

I. Wood species, export of which is under a ban

1. Narra (Pterocarpus indicus)
2. Almaciga (Agathis Philippinensis)
3. Dao (Dracontomelon dao)
4. Molave (Vitex parriflora)
5. Tindalo (Afzelia rhomboidea)
6. Ipil (Intsia bijuga)

II. Wood species, cutting of which is under a ban

1. Narra (Pterocarpus indicus)
2. Tindalo (Afzelia rhomboidea)
3. Dao (Dracontomelon dao)
4. Akle (Serialbizia acle)
5. Ipil (Intsia bijuga)
6. Acacia (Semanca samon)
7. Maranggo (Azodirachta excelsa)
8. Lamio (Dracontomelon edula)
9. Kamagon (Diospyrus Philippinensis)
10. Ebony (Diospyrus ferrea)
11. Molave (Vitex parriflora)
12. Almaciga (Agathis Philippinensis)

Table 2-5-11 Birds Observed in Luzon Island

Turnix ocellata (Scopoli)
Turnix whiteheadi Grant
Turnix worcesteri McGregor
Leucotreron marchei (Oust.)
Leucotreron merrilli McGregor
Gallicolumba luzonica (Scopoli)
Pseudoptynx philippensis, Kaup
Otus magalotus (Gray)
Otus longicornis (Grant)
Otus whiteheadi (Grant)
Prioniturus luconensis Steere
Prioniturus montanus Grant
Bolbopsittacus lunulatus (Scopoli)
Loriculus philippensis (P.L.S. Muller)
Batrachostomus micro rhynchus Grant
Halcyon lindsayi (Vigors)
Hydrocoras hydrocorax (Linnans)
Penelopides manilla (Bodd)
Centropus unirufus (Cabanis and Heine)
Dasylophus superciliosus (Cuvier)
Lepidogrammus cumingi (Frasor)
Chrysocolaptes hamatribon (Wagler)
Micro stictus funebris (Valenciennes)
Pitta Koehi Bruggemann
Thriponax sonfusus, Stresemann
Cyornis herioti, Ramasay
Rhipidura cyaniceps (Cassin)
Rhinomyias insignis Grant
Artamides striatus (Boddaert)
Pericrocotus novus, McGregor
Irena cyanogastra, Vigors
Pseudotharrhaleus caudatus Grant
Zosterornis striatus Grant
Zosterornis whiteheadi Grant
Zosterornis dennistouni Grant
Zosterornis affinis McGregor
Chaimarrornis bicolor Grant
Kitta cincla luzoniensis (Kittl)
Tribura seebohmi (Grant)
Orthotomus derbianus Moore
Orthotomus chloronotus Grant
Horornis seebohmi (Grant)
Callisitta mesoleuca (Grant)
Zosterops luzonica Grant
Dicaum luzoniense Grant
Dicaum obscurum Grant
Prionochilus anthonyi McGregor
Eudrepanis jefferyi Grant
Leptocoma henkei (Meyer)
Cyrtostomus flagrans (Oustalet)
Loxia luzoniensis Grant
Pyrrhula leucogenys Grant
Oriolus albiloris Grant
Oriolus isabella, Grant

Out of the above-listed birds, the following eight species are characteristic of the island.

Phapitreron leucotis
Loriculus philippensis
Dasylophus superciliosus
Yungipicus validirostris
Lichtensteinipicus funebris
Kittacincla luzoniensis
Cyrtostomus flagrans
Orthotomus derbianus

Table 2-5-12 Fishes in Cagayan River

| English Name | Tagalog Name | Scientific Name |
|---|---|---|
| 1. Tilapia | Tilapia | Tilapia mossambica |
| 2. Carp | Carpa | Cyprinus Carpio |
| 3. Mullet | Ludoy (Agwas) | Mugil sheli |
| 4. Goby | Bunis | Chanophorus ocellaris |
| 5. Gaurami | Gaurami | - |
| 6. Mud fish | Dalag | Ophicephalus striatus |
| 7. eel | Palos | - |
| 8. Cat fish | Ito | Clarias batrachus |
| | (1) Paltat<br>(2) Curilao | |

source : by hearing at Kasibu M.P.

## 2.5.4. Present Situation of Social Environment

### (1) Structure of the village community

#### 1) Population

According to the census conducted in 1975, the population of Kasibu Municipality is 11,490, and the number of households is 2,219 grouped into 28 bario (also called barangay). The smallest community unit below the barrio is called sitio, consisting of 5 to 10 houses (Table 2-5-13, 2-5-14). In the Kasibu Municipality, the increase in the population from 1970 to 1975 was 3,538, showing a rate of increase of 44.5%. Compared with 14.03% for the whole country of the Philippines and 23.8% for Nueva Vizcaya Province, this rate is very high. According to Table 2-5-15, the number of people who had lived in Kasibu Municipality five years before the census in 1975 was 8,580, or 89.5% of the population determined by that census. Therefore, the remaining some 10% are considered to be immigrants from other places. This trend has long been seen. For example, the population of Kasibu as of 1965, five years before the census of 1970, was 4,865 persons (or 71.09% of the number of residents in 1970). Accordingly, the remaining 30% or so were from the other places (see Table 2-5-16). Thus, the population increase in Kasibu is largely attributable to continued immigrations.

#### 2) Distribution of village communities

Barrio settlements are scattered on the hillsides along the tributaries of the Diduyon River (see Fig.2-5-8). Based on the river formation and the topographical char-

acteristics, as shown in the figure, the barrio communities can be divided into groups. They are the settlements formed along the watersheds of the Kasibu River (central district), the Campote River (south district), the Malabing River (north district) and some minor streams in the eastern area (east district). Of the above groups of settlements, the central district extends lengthwise from east to west, having the largest number of both barrios and villages. It should be noted that the administrative sphere of Kasibu Municipality does not precisely correspond with the bordering shown in the topographic map. Probably it is due to the topographical characteristics in this region.

3) Culture

Although the native tribe of Kasibu Municipality is the Ilonggot, It is now outnumbered by immigrant tribes from other areas. At present, the largest tribe is the Ifugao tribe, followed by the Ilocano tribe, the Igorot tribe, the Inibaroi tribe and the Ilonggot tribe in that order. They use their own dialects in daily conversation, though combined use of English and Tagalog is formally prescribed. The most widely used dialect is that of the predominant Ifugao, representing some 46% (see Table 2-5-17). In the municipalities neighboring Kasibu, the primary language is Ilocano (see Fig. 2-5-3). From this it is evident that the linguistic situation in Kasibu is different from other municipalities. This means that the immigrant tribes in Kasibu originate from the provinces of Ifugao, Benguet and so on. They are mainly Jesu Protestants, followed by Catholics, Protestants and Sabbatistants. There is one church for each of the religions.

4) Public facilities

The village office exists in Kasibu (Poblacion); the

post office, the tax office and the Mayor's office are accommodated in one building. The postal matter is transferred once a week to Bambang, and it takes about four days to reach Manila.

There are 6-year elementary schools and 4-year primary schools. Above the elementary schools, there is a 4-year high school. The primary school corresponds to the 1st through the 4th grades of the elementary school. The elementary schools are located in the barrios of Kongkong (Kinaro), Kasibu, Malabing, Binogawan and Muta. The primary schools are located in the barrios of Cordon, Antutot, Siguem, Bua, Lupa, Pudi, Dine, Alimit, Capisaan, Didipio and Tukod. The high school is located in Kasibu, staffed by 7 teachers and attended by 80 students. In addition, there is a complete elementary school (5 teachers and 100 pupils) under the management of a mission school (private) in sitio Paquet.

Since there is no hospital in Kasibu, patients have to travel to Bambang for hospitalization, if required. But in this region, one health nurse and two midwives have been assigned to each regional medical care unit (R.H. U.). At present, Kasibu has a nurse, and Kongkong (Kinalo) and Malabing have midwives in their clinics. In Kasibu, a sanitary inspector is posted for health care of the residents. Kasibu is also visited three times a year by the medical service team from the provincial government of Nueval Vizcaya.

The cemetery has an area of some 300 ha. In contrast to Japan and China where cremation is adopted, burial is a custom in this area. Under the mayor of the municipality, there is a 16-member Sanggunihan-Bayan (municipal council). The municipal office is staffed by 14 persons (Table 2-5-18). Besides one resident policeman, 8 P.C.F. (civilian forest patrolmen) are stationed for the security in the timbered region.

5) Structure of barrio

As in the case of the municipality, the barrio has its administrative organization headed by the barengay captain (also called barrio head). The other constituent members are 6 councilmen, one secretary and one accountant. The members used to be selected by local election every 4 years, but there has been no election since 1972. The organization is, therefore, currently steered by the people elected in 1971.

(2) Economy of the village community

1) Land exploitation

Of a total area of 44,000 ha occupied by the Kasibu barrios, 4,025.2 ha (or 9.1%) is farmland and the remaining 90.9% if woodland. The breakdown of agricultural land ownership is shown in Table 2-5-20. As summarized in the table. The rate of full ownership to the total area is 88.7%, while that of partial landholder is 5.0%. As compared with the average for all of the Nueva Vizcaya province, the percentage of individually owned farmlands is high in this area.

2) Labor and occupation

The occupational structure is as shown in Table 2-5-21. Almost 90% of the working people are engaged in primary industry, mainly agriculture. The remaining 10% includes mostly labours as minimum to support the agricultural life. Only a very few percentage of the residents are engaged in commerce, transportation and the like, and few people are working for any manufacturing industries.

3) Industry

The description hereunder briefly summarizes activities other than farming which will be detailed later in the paragraph for agriculture. Besides their main agricultural products such as cereals, the farmers are cultivating around their houses the following fruit and vegetables.

| Fruit | Vegetables |
|---|---|
| Citrus | Squash |
| Banana | Beans |
| Pineapple | Peehay |
| Papaya | Eggplant |
| Orange | Asparagus |
| Jackfruit | Okra |
| Mandalin | Ginger |
| Abogado | Potatoes |
| Coffee | Tobacco |
| Mango | |
| Coconut | |

As for fishery, the hauls in Kasibu and Maddela total up to 15.3 tons. Fish catches from the mainstream Cagayan and from tributaries are 14.2 and 1.1 tons respectively. No fisheries are on a full scale in any rivers. In Nueva Vizcaya Province, a total of 31.7 ha of breeding ponds already exists and 31 more ha. are planned. In Kasibu, there are three fishponds with a total area of 5 ha. (0.35 ha. planned) (see Table 2-5-22). No data is, however, available as to the catches from these fishponds. If exactly classified, there are 21 methods of fish catching. Of those techniques, some six are used in Nueva Vizcaya Province. (Table 2-5-23).

The forestry is monopolized by six lumbering companies who have logging rights in Kasibu area, and no one can cut and sell trees

privately. Fig.2-5-9 shows the breakdown of some 89,000 ha covered by timber concessions in Kasibu and its vicinities along the Diduyon River. The annually permissible cutting volume and the output of lumber (approximately 258,000 $m^3$) are detailed in Table 2-5-24.

As handiworks, they are making knitwear, local handicrafts, blankets (carpet) and woven goods. Rattan baskets and woodworks are also produced. With the exception of the woodcraft, the above items are the necessities of everyday life. The output of these products is not sizable as an industry, with only part of the surpluses sold for cash earning.

As a cooperative for agricultural production, the Samahang Nayon is organized independent of the Barrio. This organizations exist only in principal barrios. The barrios which have this cooperative organization are Kasibu, Macalong and Cordon. Composed of the president, a vice president, a treasurer, and personnel in charge of instruction and publicity, this cooperative is engaged in such services as fund lending and fertilizer distribution.

4) Economic activities

Because there is no trading market in Kasibu, agricultural goods produced in the villages are transported by the farmers directly to the market in Bambang 34 km distant from Kasibu, where they sell their products and buy the necessities for production and daily life. Located along National Highway No.5, Bambang is the nearest municipality from Kasibu and has a population of 8,900, the largest next to Bayombong (the capital city of the Nueva Vizcaya Province. pop., 12,950). In the town of Bambang, a market is held twice a week.

Between Kasibu and Bambang, jeeps and trucks (called weapons carriers) shuttle three times each day. The fare is five pesos one way per person. Of these shuttle trucks, one

also goes east to Siguem once a day. The fare for a one-way ride between Siguem and Bambang via Kasibu is 10 pesos per person. People living along the road between Kasibu and Siguem go to market more than twice a month. Residnets of the barrios located further east of these areas must use buffalo or go by foot to move their goods to place where trucks are available. For this reason, they can go to the market for selling and buying only once or so in a month.

The farmers do not own rice mills individually. The machines are equipped one in each of the barrios of Kasibu, Muta, Siguem and Macalong, and two in Konkong valley Kinalo Barrio. People in the neighborhood can use the mill, but those who are not must use a millstone and a pounder to polish their rice.

There are 39 small shops in Kasibu. The breakdown of these shops is as shown in Table 2-5-25. They are selling canned foods, bottled drinks, beer, salt, sugar, soap, food oil, seasonings, confectionary, bread, groceries, cooled drinks, tobacco, etc. Besides the daily necessaries, only a few luxury articles are laid out for sale.

For people who are engaged in agriculture, the majority of workers in Kasibu, the income is said to be about 1,800 to 2,500 pesos per household. The pays of those who are working in public offices are as listed in Table 2-5-26. Not much difference is recognized between the salary of an ordinary clerk and the revenues of a farmer.

(3) Utilization of water

1) Water for production

The major portion of water in Kasibu is used for farming. Not just relying on rain water, efforts

are also made for efficient use of water by irrigation. Of the total area of farmlands (1,185 ha), 44.3 % is irrigated. By raising two crops a year from nearly 70% of these irrigated fields, the irrigated area throughout the year is increased to 869.8 ha. As a result, the efficiency of land utilization is as high as 160% in terms of farmland under irrigation. The rate of irrigation is 61% in the whole Nueva Vizcaya Province. In Bambang, which is relatively rich in level ground, the rate is as high as 97%. The method of irrigation in Kasibu is restricted to water intake from mountain streams, rather than from the rivers. As stated in the above paragraph on fishery, the utilization of the rivers as fish-catching places is limited.

2) Water for living

According to the survey conducted in 1970, 99% of all household water was pumped up or obtained from wells and fountains (Table 2-5-27). This survey team observed in some villages a kind of waterworks from mountains nearby to the center of the village. The water is used for drinking, and for washing tableware and clothes. The human wastes are eased in a pit dug in the backyard ground of each dwelling, and thus excrement does not directly enter into the rivers (Table 2-5-28). The household sewages go into rivers by way of minor streams. The hygienic condition of the rivers is therefore relatively good, owing to the sparse population. In the lower reaches of the damsite there are cascades and the river flow is very rapid. Therefore, the river cannot be used for upstream or downstream navigation. Small boats are used, but only for crossing the river. The general means of transportation rely on jeep or truck. The use of helicopter is limited to some special occasions.

(4) Other conditions

Besides bronchitis, influenza, pneumonia, etc., the rate of Incidence of tropical diseases such as malaria is high (see Table 2-5-29). As shown in Table 2-5-30 listing mortality rates by cause, the percentage of mortality is high with pneumonia and tuberculosis. These figures indicate the lack of medical facilities.

According to the Mayor's office, no historical or cultural monuments are left in this region. As for mineral resources, there are deposits of gold and copper. An Australian mining concern is operating in Malabing and Ronlono (neighborhood of Barrio Binogawan ). Other potential gold deposits are sited in Barrio Didipio, and prospecting is currently under way. No data is available as to either the output or the estimated amount of deposits. National park land or anything of a like nature is not specified at or in the vicinity of the proposed site.

Table 2-5-13 Population Enumerated by Various Censuses: 1903 - 1975
(Nueva Vizcaya)

| Province/Municipality | 1903 Mar. 2 | 1918 Dec. 31 | 1939 Jan. 1 | 1948 Dec. 1 | 1960 Feb. 15 | 1970 May 6 | 1975 May 1 | Polulation Change 1975 Minus 1970 Difference | Percent |
|---|---|---|---|---|---|---|---|---|---|
| Nueva Vizcaya* | 62,541 8/ | 35,838 | 78,505 | 62,718 | 138,090 | 221,965 | 213,151 | -8,814 | -3.97 |
| Municipality of: | (11,987) | (35,832) | (74,582) | (80,198) | (113,734) | (172,195) | | (+40,953) | (23.78) |
| Ambaguio 1/ | - | - | - | - | - | 1,416 | 3,000 | 1,584 | 111.84 |
| Aritao | 477 | 1,314 | 6,208 | 7,322 | 11,209 | 18,098 | 19,075 | 977 | 5.40 |
| Bagabag | 1,907 | 3,730 | 10,702 | 10,288 | 13,805 | 16,327 | 19,188 | 2,861 | 17.52 |
| Bambang | 2,033 | 2,753 | 8,545 | 11,188 | 15,502 | 20,474 | 23,073 | 2,599 | 12.69 |
| Bayombong | 4,039 | 5,661 | 12,146 | 14,078 | 17,499 | 25,212 | 27,987 | 2,775 | 11.01 |
| Diadi 2/ | - | - | - | - | - | 4,407 | 6,649 | 2,242 | 50.87 |
| Dupax del Norte 3/ | - | - | - | - | - | - | 14,818 | - | - |
| Dupax del Sur 3/ | 1,944 | 3,669 | 6,747 | 8,904 | 10,993 | 18,241 | 10,161 | -8,080 | -44.30 |
| Kasibu 4/ | - | - | 1,591 9/ | 693 9/ | 803 | 7,952 | 11,490 | 3,530 | 44.49 |
| Kayapa 5/ | - | 7,577 9/ | 8,702 9/ | 5,759 9/ | 9,298 | 14,920 | 20,718 | 5,798 | 38.86 |
| Quezon 5/ | - | - | - | - | - | 5,156 | 7,405 | 2,249 | 43.62 |
| Santa fe 6/ | - | 3,571 | 2,043 | 2,126 | 4,982 | 4,254 | 5,961 | 1,707 | 40.13 |
| Solano | 5,624 | 7,563 | 17,878 | 19,840 | 22,523 | 27,032 | 33,036 | 6,004 | 22,21 |
| Villa Verde 7/ | - | - | - | - | 7,120 | 8,709 | 10,590 | 1,881 | 21.60 |

* Includes the subprovince of quirino which was converted into a regular province on September 10, 1971 under R.A. No.6394.
1/ Created municipal district June 18, 1966 under R.A. No.4735, taken from Bayombong.
2/ Created municipal district June 17, 1967 under R.A. No.4973, taken from Bagabag.
3/ Created saparate municipality August 16, 1971 under R.A. No.6732, taken from the former municipality of Depax.
4/ Formerly a municipal district; converted into a regular municipality June 23, 1969 under E.O. No.184.
5/ Formerly a municipal district; converted into a regular municipality November 11, 1950 under E.O. No. 369.
6/ Imugan in 1918, 1939 and 1948; converted into a regular municipality July 18, 1967 under E.O. No.77.
7/ Formerly Ibung; renamed Villa Verde June 21, 1959 under R.A. No.2515.
8/ Includes undistributed non-christian population of 46,515.
9/ Includes population of former mulicipality of Sta. Cruz. later renamed Pingkian. ( ): total of existing municipality.
Source: 1975 Integrated Census of the Population and Its Economics Activities (Population Nueva Vizcaya): Neda

Table 2-5-14 Population Statics of Kasibu Municipality for 1975

| Municipality/Barangay | Total Population | | | Household Population | | | Number of Households |
|---|---|---|---|---|---|---|---|
| | Both Sexes | Male | Female | Both Sexes | Male | Female | |
| Nueva Vizcaya | 213,151 | 108,022 | 105,129 | 212,991 | 107,920 | 105,071 | 26,210 |
| Kasibu | 11,490 | 6,070 | 5,420 | 11,444 | 6,024 | 5,420 | 2,219 |
| Poblacion (R) | 752 | 402 | 350 | 706 | 354 | 350 | 127 |
| Bua (R) | 378 | 200 | 178 | 378 | 200 | 178 | 78 |
| Cordon (R) | 477 | 246 | 231 | 477 | 246 | 231 | 85 |
| Macalong (R) | 427 | 227 | 200 | 427 | 227 | 200 | 72 |
| Malabing (R) | 577 | 183 | 194 | 377 | 183 | 194 | 63 |
| Kakiduguen (R) | 315 | 173 | 142 | 315 | 173 | 142 | 59 |
| Kinalo (R) | 592 | 293 | 299 | 592 | 293 | 299 | 101 |
| Muta (R) | 740 | 386 | 354 | 740 | 386 | 354 | 148 |
| Antutot (R) | 243 | 119 | 124 | 243 | 119 | 124 | 52 |
| Binogawan (R) | 386 | 200 | 186 | 386 | 200 | 186 | 68 |
| Capisaan (R) | 313 | 162 | 151 | 313 | 162 | 151 | 55 |
| Didipio (R) | 589 | 306 | 283 | 589 | 306 | 283 | 122 |
| Catarawan (R) | 159 | 87 | 72 | 159 | 87 | 72 | 41 |
| Nantawacan (R) | 437 | 234 | 203 | 437 | 234 | 203 | 102 |
| Pao (R) | 445 | 245 | 200 | 445 | 245 | 200 | 78 |
| Siguem (R) | 539 | 291 | 248 | 539 | 291 | 248 | 95 |
| Tukod (R) | 527 | 273 | 254 | 527 | 273 | 254 | 107 |
| Alimit (R) | 338 | 178 | 160 | 338 | 178 | 160 | 72 |
| Belet (R) | 225 | 120 | 105 | 225 | 120 | 105 | 43 |
| Biyoy (R) | 472 | 263 | 209 | 472 | 263 | 209 | 105 |
| Camamasi (R) | 127 | 89 | 68 | 157 | 89 | 68 | 26 |
| Dine (R) | 398 | 203 | 195 | 398 | 203 | 195 | 92 |
| Lupa (R) | 371 | 211 | 160 | 371 | 211 | 160 | 68 |
| Papaya (R) | 318 | 174 | 144 | 318 | 174 | 144 | 69 |
| Pudi (R) | 502 | 271 | 231 | 502 | 271 | 231 | 99 |
| Tadji (R) | 309 | 155 | 154 | 309 | 155 | 154 | 60 |
| Wangal (R) | 316 | 159 | 157 | 316 | 159 | 157 | 53 |
| Watwat (R) | 388 | 220 | 168 | 388 | 220 | 168 | 79 |

Source: 1975 Integrated Census of the Population and Its Economics Activities (Population Nueva Vizcaya): Neda

Table 2-5-15 Population 5 Years Old and Over

in Nueva Vizcaya P.V. and Kasibu M.P., Residence on May 6, 1970

| Present Residence, Sex and Municipality | Total | Residence on May 6, 1970 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Same Barangay | | Another Barangay Same Municipality | | | Another Municipality Same Province | | | Another Province | | | Foreign Country | Not Stated |
| | | Urban | Rural | Urban | Rural | Unknown | Urban | Rural | Unknown | Urban | Rural | Unknown | | |
| NUEVA VIZCAYA | | | | | | | | | | | | | | |
| Both Sexes | 180,557 | 27,700 | 138,218 | 270 | 1,805 | 15 | 1,094 | 1,709 | 10 | 4,049 | 3,886 | 502 | 42 | 1,257 |
| Male | 91,524 | 13,748 | 70,279 | 129 | 910 | 9 | 518 | 832 | 5 | 2,123 | 2,017 | 273 | 24 | 657 |
| Female | 89,033 | 13,952 | 67,939 | 141 | 895 | 6 | 576 | 877 | 5 | 1,926 | 1,869 | 229 | 18 | 600 |
| KASIBU | | | | | | | | | | | | | | |
| Both Sexes | 9,588 | - | 8,490 | - | 90 | - | 74 | 115 | - | 446 | 236 | 32 | 1 | 104 |
| Male | 5,096 | - | 4,465 | - | 45 | - | 44 | 65 | - | 246 | 148 | 24 | 1 | 56 |
| Female | 4,492 | - | 4,025 | - | 45 | - | 30 | 50 | - | 200 | 88 | 8 | - | 46 |
| Both Sexes of Percentage Distribution | 100% | | 88.5 | | 0.9 | | 0.8 | 1.2 | | 4.7 | 24 | 0.3 | 0 | 1.0 |

Source : 1975 Integrated Census of the Population and Its Economics Activities
(Population Nueva Vizcaya : Neda)

Table 2-5-16 Place of Residence of Population 5 Years Old and Over in Nueva Vizcaya P.V. and Kasibu M.P.

| Province/Municipality of Residence and Sex | Total Residents | Place of Residence in May 1965 | | | | |
|---|---|---|---|---|---|---|
| | | Same Municipality | Other Municipality Same Province | Other Province | Foreign Country | Not Stated |
| Nueva Vizcaya | | | | | | |
| Both Sexes ..... | 186,184 | 162,296 | 9,511 | 14,094 | 2 | 281 |
| Male ..... | 94,148 | 81,839 | 4,836 | 7,262 | 2 | 209 |
| Female ..... | 92,036 | 60,457 | 4,675 | 6,832 | - | 72 |
| Kasibu | | | | | | |
| Both Sexes ..... | 6,843 | 4,865 | 648 | 1,308 | - | 22 |
| Male ..... | 3,582 | 2,674 | 270 | 616 | - | 22 |
| Female ..... | 3,261 | 2,191 | 378 | 692 | - | - |

Source: 1970 Population Census

Table 2-5-17 (1) **Mother Tongues Spoken in Nueva Vizcaya P.V. and Kasibu M.P.** (as of 1975)

| | Nueva Vizcaya | | | Kasibu | | |
|---|---|---|---|---|---|---|
| | number | Percentage | 70 ∿ 75 * | number | Percentage | 70 ∿ 75 * |
| Ilocano | 139,753 | 66 | 82 | 2,825 | 25 | 93 |
| Ifugao | 26,340 | 12 | 327 | 5,301 | 46 | 139 |
| Tagalog | 10,816 | 5 | 113 | | | |
| Inibaloi | 8,320 | 4 | 132 | 2,506 | 22 | 461 |
| Gaddang | 6,350 | 3 | 109 | | | |
| Other local dialects | 6,143 | 3 | | 135 | 1 | 287 |
| Isinai | 4,851 | 2 | 64 | | | |
| Ilonggot | 2,279 | 1 | 114 | 489 | 4 | 147 |
| Pangasinan | 1,810 | 1 | 126 | | | |
| Kangkanai | 1,473 | 1 | | | | |
| All other dialects | 5,013 | 2 | | 233 | 2 | |
| Not stated | 3 | 0 | | 1 | 0 | |
| **Total** | 213,151 | 100 | | 11,490 | 100 | 144 |

* Rate of Increase from 1970 to 1975 (Percentage)

**Source** : 1975 Integrated Census of the Population and Its Economics Activities (Population Nueva Vizcaya)

Table 2-5-17 (2) Mother Tongues Spoken in Nueva Vizcaya P.V. and Kasibu M.P. as of 1970

| | Nueva Vizcaya | | Kasibu | |
|---|---|---|---|---|
| | Number | Percentage | Number | Percentage |
| Ilonano | (1) 169,502 | 76 | (2) 3,039 | 38 |
| Ifugao | (2) 8,045 | 4 | (1) 3,823 | 48 |
| Tagalog | (3) 9,594 | 4 | | |
| Inibaloi | (5) 6,283 | 3 | (3) 544 | 7 |
| Gaddang | (6) 5,808 | 3 | (5) 64 | 1 |
| Other local dialects | 1,495 | 1 | (6) 47 | 1 |
| Isinai | (4) 7,576 | 3 | | |
| Ilonggot | (7) 2,007 | 3 | (4) 332 | 4 |
| Pangasinan | (9) 1,441 | 0 | | |
| Kangkanai | - | | | |
| All other dialects | 10,272 | 5 | 100 | 1 |
| Not stated | 42 | 0 | 3 | 0 |
| Total | 221,965 | 100 | 7,952 | 100 |

Source : 1970 Population Census

Table 2-5-18 Member of Kasibu M.P. Office as of July 1978

| |
|---|
| Mayor |
| Member Sanggunihan Bayan ( 16 Member ) |
| Municipal Secretary |
| Municipal Judge * |
| Municipal Development Officer |
| Post Office - Post Master |
| Treasurer |
| Assistant Treasurer |
| Book Keeper |
| BIR Clerk |
| Market Collector |
| Market Clerk |
| Assessment Deputy Assessor |
| Filling Clerk |
| Asst. Market Collector |
| Land Tax Clerk |
| Janitor |

Source : Kasibu M.P. Office

Table 2-5-19 Farm Area Classified by Land Use (1971)

(Nueva Vizcaya P.V. Kasibu M.P.)

(ha)

| | Total Area of Farms | Arable Land | | | Land Planted to Permanent crops | Land under Permanent Meadows and Pastures | Land Covered With Forest Growth | All Other Land |
|---|---|---|---|---|---|---|---|---|
| | | Total Arable Land | Planted to Temporary Crops | Lying Idle | | | | |
| Nueva Vizcaya | 58,913.7 | 38,278.2 | 34,060.2 | 4,218.0 | 4,183.3 | 11,498.1 | 2,792.1 | 2,162.0 |
| | 100% | 65.0% | 57.8% | 7.2% | 7.1% | 19.5% | 4.7% | 3.7% |
| Kasibu | 4,029.2 | 2,108.2 | 1,677.2 | 431.0 | 391.6 | 566.0 | 605.2 | 354.2 |
| | 100% | 52.4% | 41.7% | 10.7% | 9.7% | 14.1% | 15.0% | 8.8% |

Source : 1971 Census of Agriculture : Neda
(Nueva Vizcaya)

Table 2-5-20 (1) Farm Area Classified by Tenure of Operator and by Municipality: Crop Year 1970-71

(Nueva Vizcaya P.V.)

(Number)

| Municipality | Total Area of Farms | BY TENURE OF OPERATOR | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Full-Owner | Part Owner | TENANT | | | | | | Manager | Other Forms of Tenure |
| | | | | Total-All Types | Cash | Shape of Produce | Fixed Amount of Produce | Rent Free | Others | | |
| NUEVE VIZCAYA | 58,913.7 | 36,993.0 | 9,409.9 | 10,526.4 | 124.3 | 7,418.8 | 245.8 | 1,578.1 | 1,159.4 | 400.6 | 1,583.8 |
| Bayonbong | 5,479.5 | 2,984.0 | 1,669.7 | 811.7 | .0 | 771.9 | .0 | 11.5 | 28.3 | 6.7 | 7.5 |
| Aglipay | 2,834.7 | 2,080.0 | 311.9 | 50.0 | .0 | 27.0 | .0 | 23.0 | .0 | .0 | 392.8 |
| Aritao | 3,518.5 | 2,503.9 | 417.2 | 531.7 | .0 | 284.0 | 12.5 | 235.2 | .0 | .0 | 65.7 |
| Bagabag | 3,677.2 | 1,334.4 | 1,259.9 | 1,082.9 | 5.5 | 1,057.2 | 8.0 | .0 | 12.3 | .0 | .0 |
| Bambang | 5,087.2 | 3,836.4 | 374.4 | 853.9 | .0 | 825.9 | .0 | 18.0 | 10.0 | .0 | 22.5 |
| Diffun | 4,220.6 | 2,611.2 | 717.0 | 798.5 | 7.5 | 733.6 | 10.0 | 8.0 | 39.4 | 93.9 | .0 |
| Dupax | 4,929.3 | 3,679.3 | 774.3 | 411.0 | .0 | 192.6 | .0 | 218.5 | .0 | .0 | 64.7 |
| Kasibu | 4,025.2 | 3,571.2 | 202.5 | 234.0 | .0 | 217.8 | .0 | 16.3 | .0 | .0 | 17.5 |
| Kayapa | 4,121.4 | 3,809.6 | 6.0 | 5.8 | .0 | 5.8 | .0 | .0 | .0 | 300.0 | .0 |
| Maddela | 4,957.2 | 3,386.1 | 920.0 | 458.6 | 78.3 | 308.3 | .0 | 15.1 | 57.0 | .0 | 192.0 |
| Quezon | 1,172.7 | 608.9 | 208.7 | 289.0 | .0 | 56.4 | 24.0 | 208.6 | .0 | .0 | 66.2 |
| Saguday | 1,827.8 | 1,363.3 | 79.0 | 385.5 | 24.0 | 361.5 | .0 | .0 | .0 | .0 | .0 |
| Santa Fe | 870.2 | 846.2 | .0 | 24.0 | .0 | 24.0 | .0 | .0 | .0 | .0 | .0 |
| Solano | 4,314.2 | 1,438.1 | 1,169.3 | 1,546.7 | .0 | 1,348.8 | 101.3 | 55.6 | 41.0 | .0 | 160.1 |
| Villa Verde | 3,156.8 | 950.2 | 950.1 | 1,015.4 | .0 | 772.9 | 80.0 | 134.0 | 28.5 | .0 | 241.1 |
| Ambaguio | 893.4 | 355.9 | 26.4 | 182.2 | .0 | .0 | .0 | 182.2 | .0 | .0 | 329.0 |
| Diadi | 2,512.3 | 608.3 | 102.1 | 1,423.9 | .0 | 43.7 | .0 | 452.3 | 928.0 | .0 | 18.0 |
| Cabarroquis | 1,675.5 | 1,026.1 | 221.6 | 421.6 | 9.0 | 387.6 | 10.0 | .0 | 15.0 | .0 | 6.2 |

Source : 1971 Census of Agriculture (Nueva Vizcaya P.V.): Neda

Table 2-5-20 (2) Farm Number, Classified by Size and Tenure of Operator (April 1971) (Nueva Vizcaya P.V.)

| Tenure of Farm Operator | Total Number of Farms | SIZE OF FARMS | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Under 1 ha. | 1-2 ha. | 3-5 ha | 5-10 ha | 10-25 ha | 25-50 ha. | Over 50 ha. |
| All Farms | 20,287 | 2,809 | 11,400 | 4,131 | 1,581 | 292 | 13 | 52 |
| Full-Owner | 11,388 | 1,631 | 5,886 | 2,477 | 1,146 | 197 | 7 | 46 |
| Part-Owner | 3,592 | 283 | 2,279 | 724 | 231 | 71 | 4 | - |
| Tenant, all types | 4,851 | 885 | 3,030 | 780 | 140 | 10 | - | 6 |
| Cash | 79 | 12 | 61 | 6 | - | - | - | - |
| Share of Produce | 3,764 | 611 | 2,420 | 620 | 106 | 5 | - | 2 |
| Fixed Amount of Produce | 137 | 24 | 102 | 10 | - | 1 | - | - |
| Rent Free | 781 | 238 | 386 | 123 | 29 | 3 | - | 2 |
| Others | 90 | - | 61 | 21 | 5 | 1 | - | 2 |
| Manager | 4 | - | - | - | 1 | - | 2 | 1 |
| Other Forms of Tenure | 452 | 10 | 214 | 150 | 63 | 14 | - | 1 |

Source : 1971 Census of Agricuture (Nueva Vizcaya P.V.): Neda

Table 2-5-20 (3) Farm Area Classified by Size and Tenure of Operator ( April 1971 ) ( Nueva Vizcaya P.V.)

| Tenure of Farm Operator | Total Number of Farms (ha) | SIZE OF FARM | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Under 1 ha | 1 - 2 ha | 3 - 5 ha | 5 - 10 ha | 10 - 25 ha | 25 - 50 ha | Over 50 ha |
| All Farms | 58,913.7 | 1,475.3 | 18,881.0 | 14,604.3 | 9,702.0 | 3,906.4 | 415.2 | 9,929.5 |
| Full-Owner | 36,993.0 | 830.4 | 9,494.2 | 8,726.9 | 6,990.9 | 2,641.6 | 209.4 | 8,099.2 |
| Part-Owner | 9,409.9 | 170.2 | 4,154.1 | 2,589.4 | 1,478.9 | 905.5 | 111.0 | .0 |
| Tenant, all types | 10,526.4 | 469.7 | 4,873.2 | 2,737.2 | 823.0 | 143.5 | .0 | 1,479.8 |
| Cash | 124.3 | 7.4 | 92.8 | 24.0 | .0 | .0 | .0 | .0 |
| Share of Produce | 7,418.8 | 329.3 | 3,843.5 | 2,181.3 | 634.4 | 78.5 | .0 | 351.8 |
| Fixed Amount of Produce | 245.8 | 12.0 | 179.8 | 30.0 | .0 | 24.0 | .0 | .0 |
| Rent Free | 1,578.1 | 120.9 | 637.5 | 426.2 | 163.6 | 30.0 | .0 | 200.0 |
| Others | 1,159.4 | .0 | 119.7 | 75.8 | 25.0 | 11.0 | .0 | 928.0 |
| Manager | 400.6 | .0 | .0 | .0 | 6.7 | .0 | 93.9 | 300.0 |
| Other Forms of Tenure | 1,583.8 | 5.0 | 359.5 | 550.9 | 402.6 | 215.8 | .0 | 50.1 |

Source : 1971 Census of Agriculture (Nueva Vizcaya M.P.) : Neda

Table 2-5-21 Experienced Workers 10 Years Old and Over
(KASIBU M.P.)

Major Occupation and Municipality: 1970

| Province Municipality and sex | | Nueva Vizcaya both sexes | Kasibu both sexes | Percentage Distribution | |
|---|---|---|---|---|---|
| | | | | Nueva Vizcaya | Kasibu |
| All occupations | | 74,778 | 3,545 | | |
| Occupation | Professional Technical and Related Workers | 3,307 | 85 | 4.4 | 2.4 |
| | Administrative Executive, and Managerial Workers | 280 | 21 | 0.4 | 0.6 |
| | Clerical Workers | 1,095 | - | 1.5 | - |
| | Sales Workers | 2,735 | 24 | 3.7 | 0.7 |
| | Farmers, Fishermen, Hunters, Loggers, and Related Workers | 56,159 | 3,186 | 75.1 | 89.8 |
| | Miners,Quarrymen and Related Workers | 21 | - | 0.0 | - |
| | Wokers in Transport and Communication | 2,105 | 42 | 2.8 | 1.2 |
| | Craftsmen, Production Process Workers, and Laborers, etc. | 4,815 | 22 | 6.4 | 0.6 |
| | Service,Sport and Related Workers | 2,778 | 117 | 3.7 | 3.3 |
| | Stevedores and Related Freight Handlers and Laborers, etc. | 910 | - | 1.2 | - |
| | Occupation Unidentifiable, Members of the Armed Forces | 218 | - | 0.3 | - |
| | Not Stated | 355 | 48 | 0.5 | 1.4 |

Source: 1970 Census of Population and Housing.

Table 2-5-22 Fish Ponds in Nueva Vizcaya P.V.

| Municipality | Target (ha) | | Total (ha) |
|---|---|---|---|
| | to be improved | to be developed | |
| Aritao | .4589 | .1731 | .632 |
| Bagabag | 6.1125 | 2.6925 | 8.805 |
| Banbang | 4.305 | 6.158 | 10.463 |
| Bayombong | 5.2113 | 3.6613 | 8.8726 |
| Diadi | .24 | .12 | .36 |
| Dupax Del Norte<br>Dupax Del Sur | 1.4016 | 2.2066 | 3.6082 |
| Kasibu | 5.080 | .035 | 5.115 |
| Kayapa | .30 | .07 | .37 |
| Quezon | 2.65 | 4.30 | 6.95 |
| Santa Fe | .265 | .005 | .27 |
| Solano | 4.4185 | 8.9715 | 13.39 |
| Villa Verde | 1.22 | 2.62 | 3.84 |
| Total | 31.6628 | 31.013 | 62.6758 |

Source: Bureau of Fishery in Bayombong

Fish Ponds in Kasibu M.P.

| Barrio | Target (ha) | | Total (ha) |
|---|---|---|---|
| | to be improved | to be developed | |
| Pudi | .035 | .035 | .07 |
| Kasibu | 5.015 | | 5.015 |
| Kasibu | .030 | | .030 |
| Total | 5.080 | .035 | 5.115 |

Source : Bureau of Fishery in Bayombong.

Table 2-5-23 Fishing Gear Used

Fishing Gear Used in Philippine

1 Beach Seine
2 Cast Net
3 Crap-Lift Net
4 Gill Net
5 Push Net
6 Hook and Line
7 Long Line
8 Troll Line
9 Ring Net
10 Baby Trawl
11 Dredge
12 Lift Net
13 Filter Net
14 Round Haul Seine
15 Fish Corral
16 Lambaklad
17 Scoop Net
18 Others
19 Pana

Fishing Gear Used in Cagayan

a. Cast Net ..... Carp, Tilapia, Goby, Mudfish
b. Gill Net ..... Carp, Tilapia, Goby, Mudfish
c. Pusa Net ..... Carp, Tilapia, Goby, Mudfish
d. Hook and Line ..... Tilapia, Goby, Mudfish
e. Scoop Net ..... Carp, Tialpia, Goby, Mudfish
f. Pana (Speak) ..... Carp, Tilapia, Goby, Mudfish

Source : Bureau of Fisherery in Bayombong (as of 1978)

Table 2-5-24 Timber License Areas Around Kasibu & Diduyon River

| Name of Company | 1. Total | 2. Annual Allowable Cut | 3. Log Production CY 1977 | Remarks |
|---|---|---|---|---|
| | ha | $m^3$ | $m^3$ | |
| I - C&M Timber Corp. | 7,852.0 | 131,520 | 42,446.83 | Partly covering areas within Diduyon |
| II - FCA Timber Corp. | 41,050.0 | 48,200 | 48,412.44 | Partly covering areas of vicinities of Diduyon River, Quirino, Province |
| III - Luzon Loggers. Inc. | 25,450.0 | 48,238 | 34,567.28 | Covering vicinities of Diduyon River and Kasibu River area within Nueva Vizcaya and Quirino Province |
| IV - Kasibu Logging | 7,852.0 | 15,532 | 10,736.50 | Within Kasibu River |
| V - Cross Country Dev. Corp. | 4,130.0 | 8,156 | 3,644.23 | Partly within Kasibu River |
| VI - B.V. Cuaresma | 2,675.0 | 6,406 | 419.38 | Within Kasibu River |
| Total | 89,009.0 ha | 258.052 $m^3$ | 140,226.66 $m^3$ | |

Note : All species found within the license areas are mostly dipterocarps.

Source : Bureau of Forest Development, Office of the Regional Director, Region 2 Tuguegarao, Cagayan

Table 2-5-25 Commercial System in Kasibu M.P.

| Barrio Name | Number of Stores |
|---|---|
| Poblacion (Kasibu) | 9 |
| Didipio | 8 |
| Muta | 3 |
| Siguem | 4 |
| Binogawan | 3 |
| Kinalo (Kong Kong) | 5 |
| Antutot | 3 |
| Malabing | 4 |
| Total | 39 |

Source : Hearing at Kasibu M.P. Office

Table 2-5-26 Income of Office Staff (1978)
(Kasibu M.P. Office)

Municipality of Kasibu

₱158,000/year for Kasibu
₱1,800/Household (Income)

Mayor - ALBERTO BUMOLO
Member Sanggunihan Bayan

1. Rafael Barasi
2. Jacinto Aligoyon
3. Pablo Nicampo
4. Simon Baybaya
5. Maris Camaling
6. Pedireco Mico
7. William Antonio
8. Rimando Tictic
9. Felipe Rumas
10. Helnumegildo Agsunod
11. Juan Villaglores
12. Ernesto Dinero
13. Bernardo Asuncion
14. Jose Tigo
15. Jose Sabado
16. Alejo Velasco

₱2,000/session (Average Income)

Municipal Secretary - Victor Guison (₱620.00/month)
Municipal Judge - Catalino M. Raffeda (One Cleark) Solidad Corpus *
Municipal Development Officer - Elpidio Dulay
Post Office - (1) Tranquilino Lihso (Post Master - ₱40.00/month)
Every Monday to Bambang (Motorcycle)
Treasurer - Rodolfo Amoma (₱1,400.00/month)
Assistant Treasurer - Leon Audalar (₱620.00/month)
Book Keeper - Gaspar Beatan (₱400.00/month)
BIR Clerk - Alfredo Bullong (₱230.00/month)
Market Collector - Eliza Guison (₱187.20/month)
Clerk - Julieta Tulpi (₱187.20/month)
Assessment
Deputy Assessor - Mrs. Lurita V. Liclicam (₱187.20/month)
- Mr. Reymundo Alopias (₱187.20/month)
- Miss Norms Hupalar (Casual - ₱6.00/day)
Filling Clerk - Evangeline Tukid (₱201.00/month)
Asst. Market Collector - Mr. Santos Dulnuan (₱180.00/month)
Land Tax Clerk - Miss Regins Canlas (₱230.40/month)
Janitor - Domingo Awicdi (₱144.00/month)

Sub-station Commander - Dulnuan, Virgilio (Corporal - ₱537.00/month)

| | | |
|---|---|---|
| (PFC) | Bonifacio Guieon | ₱466.00 |
| PCF | Crisostomo Bulinag | ₱466.00 |
| Patrolman | Alberto Daulayan | ₱406.00 |
| | Wilfredo Liclican | ₱406.00 |
| | Pablo Domingo | ₱406.00 |
| | Daniel Kaimmayong | ₱406.00 |
| | Amelito Absalon | ₱406.00 |
| | Lodorico Mayang | ₱406.00 |

Living Allowance - ₱50.00/month Working Allowance - ₱30.00

Source: Kasibu M.P. Office

* Municipal Judge is paid from National Government

Table 2-5-27 Number of Households in Occupied Dwelling Units Classified by Type of Water Supply Used (Kasibu M.P., 1970)

| | Total Number of Households | Type of Water Supply in Dwelling Units | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Piped Water | Artesian Well | Pump | Open Well | Spring | Rainwater | Lake, River Stream, etc. |
| Nueva Vizcaya | 38,595 | 1,828 | 427 | 24,944 | 6,059 | 4,752 | 12 | 573 |
| Kasibu | 1,521 | - | - | 105 | 1,306 | 88 | - | 22 |
| Percentage of Distribution | | | | | | | | |
| Nueva Vizcaya | 100.0 | 4.8 | 1.1 | 64.6 | 15.7 | 12.3 | 0 | 1.5 |
| Kasibu | 100.0 | - | - | 6.9 | 85.9 | 5.8 | - | 1.4 |

Source : 1970 Census of Population and Housing (Nueva Vizcaya P.V.)

Table 2-5-28 Number of Households in Occupied Dwelling Units Classified by Type of Toilet Facilities: 1970

| | Total Number of Households | Type of Toilet Facilities | | | | |
|---|---|---|---|---|---|---|
| | | Flush/Water Sealed | Antipolo/ Closed Pit | Open Pit | Public Toilet | None |
| Nueva Vizcaya | 38,595 | 3,795 | 10,706 | 20,746 | 221 | 2,927 |
| Kasibu | 1,521 | 4 | 20 | 1,327 | 25 | 145 |
| Percentage Distribution | | | | | | |
| Nueva Vizcaya | 100.0 | 10.3 | 27.7 | 53.8 | 0.6 | 7.6 |
| Kasibu | 100.0 | 0.3 | 1.3 | 87.3 | 1.6 | 9.5 |

1970 Population Census

Table 2-5-29 Morbidity, 10 Leading Causes, Number and Rate in Health Region 2, 1977

Unit : Number
Rate - per 100,000 Populations

| Causes | Nueva Vizcaya | | Percentage | Regional Total | | Percentage |
|---|---|---|---|---|---|---|
| | Number | Rate | | Number | Rate | |
| Gastro-Enteritis | 847 | 378.56 | 7.77 | 5,859 | 284.26 | 10.60 |
| Infectious Heppatitis | | | | 5,380 | 261.02 | 0.75 |
| Bronchitis | 5,278 | 2,359.00 | 48.44 | 12,284 | 595.98 | 22.25 |
| Influenza | 2,144 | 928.26 | 19.68 | 14,123 | 685.2 | 35.58 |
| Pneumonia | 1,742 | 778.50 | 15.99 | 41,355 | 211.20 | 7.89 |
| Malaria | 436 | 194.87 | 4.00 | 4,776 | 280.23 | 10.45 |
| T.B.(Respiratory) | 154 | 68.83 | 1.41 | 5,322 | 250.2 | 9.64 |
| Dysentery | 231 | 103.24 | 2.12 | 1,224 | 59.30 | 2.21 |
| Measles | 33 | 14.74 | 0.30 | 624 | 30.46 | 1.13 |
| Whooping Cough | 31 | 13.35 | 0.28 | 278 | 13.48 | 0.50 |
| Total | 10,896 | 4,839.93 | 99.99 | 92,225 | 2,679.49 | 110.00 |

Source : "Annual Report, Calender Year 1977", Regional Health Office No. 2

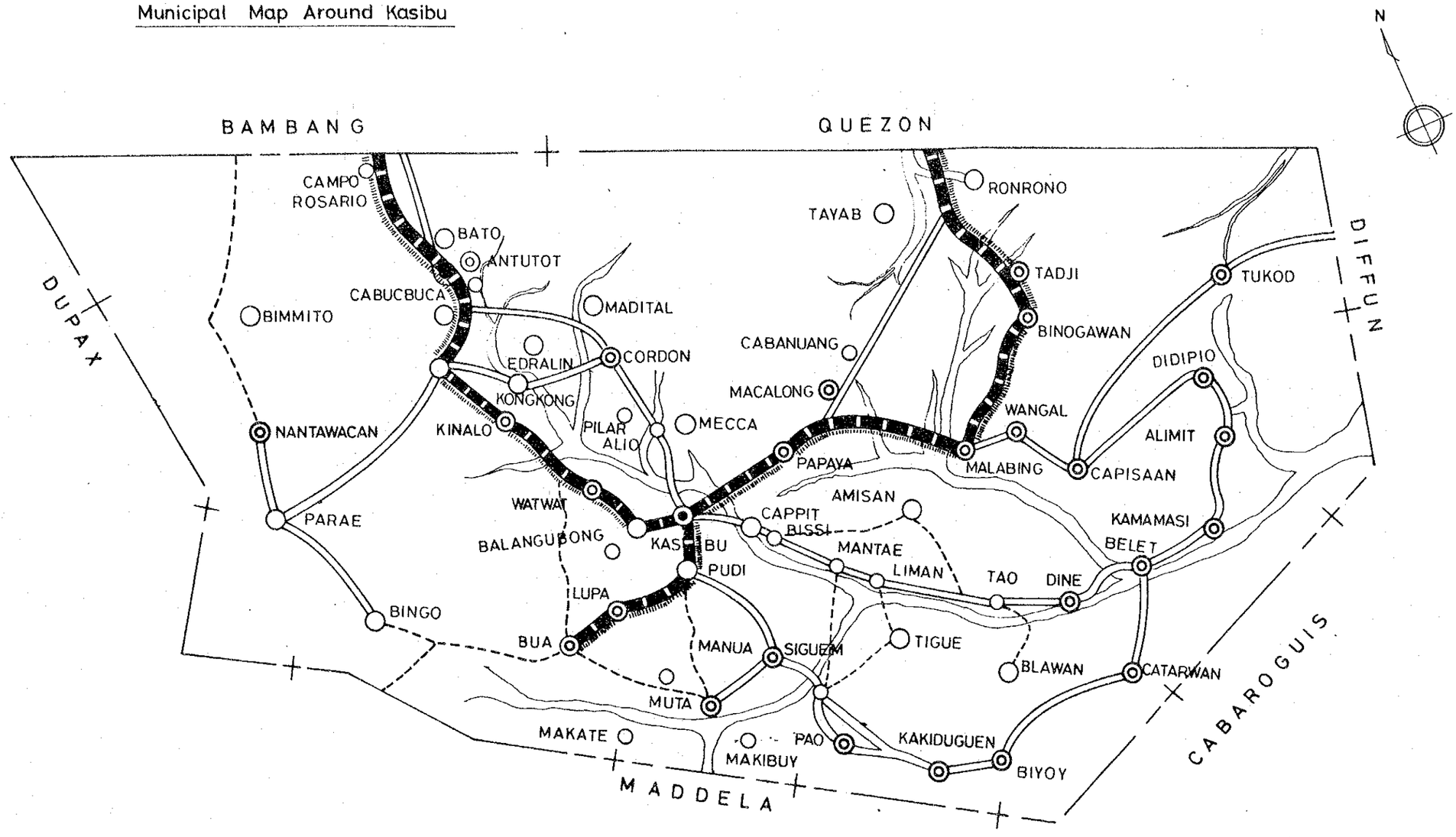
Table 2-5-30 Mortality, 10 Leading Causes, Number, Rate and Percentage in Health Region 2 , 1977

Unit : Number
Rate - per 100,000 Populations

| Causes | Nueva Vizcaya | | Percentage | Regional Total | | Percentage |
|---|---|---|---|---|---|---|
| | Number | Rate | | Number | Rate | |
| Pnoumonia | 37 | 16.53 | 39.78 | 1,583 | 76.80 | 27.50 |
| Cardie-Vascular | | | | 588 | 28.52 | 10.24 |
| Ill defined Disease | 8 | 3.75 | 8.60 | 608 | 29.49 | 10.60 |
| Accidents & Assaults | 3 | 1.34 | 3.23 | 518 | 25.13 | 9.20 |
| T.B. (Respiratory) | 20 | 3.93 | 21.51 | 771 | 37.40 | 13.42 |
| Senility | 11 | 4.91 | 11.83 | 506 | 24.54 | 8.81 |
| Gastro-Enteritis | 2 | 0.89 | 2.15 | 366 | 17.75 | 6.38 |
| Bronchitis | 9 | 4.02 | 9.68 | 341 | 16.54 | 5.94 |
| Tetanus | | | | 251 | 12.17 | 4.37 |
| Beri-Beri | 3 | 1.34 | 3.23 | 208 | 10.09 | 3.68 |
| Total | 93 | 41.71 | 100.01 | 5,740 | 241.03 | 100.16 |

Source : "Annual Report Calendar Year 1977", Regional Health Office No. 2

## Municipal Map Around Kasibu



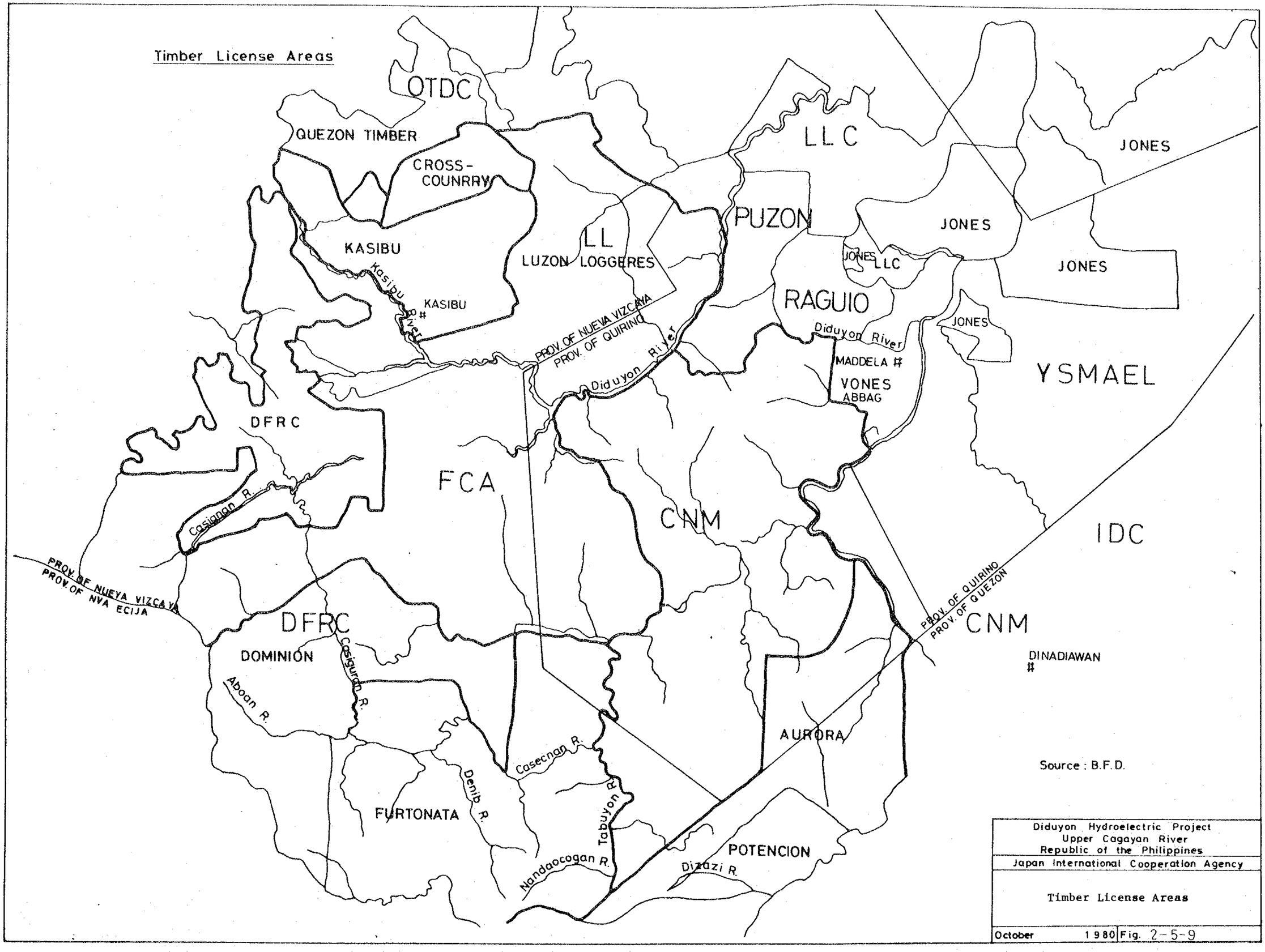

Legend

- National Road
- Provincial Road
- Logging Road
- Municipal Boundary
- Municipal Capital
- Barrio
- Sitio

Source: Kasibu Municipal Office

| | |
|---|---|
| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
| Japan International Cooperation Agency | |
| Municipal Map around Kasibu | |
| October · 1980 | Fig. 2-5-8 |

Timber License Areas




Source : B.F.D.

| | |
|---|---|
| Diduyon Hydroelectric Project<br>Upper Cagayan River<br>Republic of the Philippines | |
| Japan International Cooperation Agency | |
| Timber License Areas | |
| October 1980 | Fig. 2-5-9 |

## 2.5.5. Agricultural Aspects

### (1) Agriculture in the watershed of the Upper Cagayan River

#### 1) General

The project site is situated in the watershed of the Upstream Cagayan which is vulnerable to the occasional attack of typhoons. But in the plain areas extending far and wide, there are many rain-fed paddy fields which do not require irrigation facilities. The crop other than rice is mainly corn. In the area of which a glimpse gives the impression of wilderness set aside, traces of cultivation can be recognized. The manner of cultivation is rather extensive. The hillsides are less exploited than the plains. Only parts of the elevated areas are used for farming and cattle-breeding, and the rest are left unused. The population in the farm villages of Nueva Vizcaya P.V. is 128,752, of which 115,189 persons or 89.5% owns farming fields of 1 to 3 ha. In Isabela P.V., the number of farmers is 447,208, and 378,604 persons or 84.7% of that population have farming lands of only 1 ha or so each. In recent years, however, a dramatic increase in agricultural production has been witnessed in the vicinity of the watershed of the Cagayan River. As shown in Table 2-5-31, the area of cultivation was only $48.23 \times 10^3$ ha in 1973. In the past half decade, the production of rice has increased by 29%, while corn production is said to have doubled.

#### 2) Production of rice

In the three provinces of Nueva Nizcaya, Quirino and Isabela adjoining the upper Cagayan River, the total area of rice cultivation in 1971 was 178,715.3 ha (165,000 ha in the 1972 crop year), and the yield was 7,490,574 Cavan, amounting to ₱163,000,443 (according to agricultural

statics for 1971). Though rice production is so ample that the surplus can be sent to other regions, it is still low in light of the national average. Table 2-5-32 shows the yields of rich per ha for each of the five years from 1968 to 1972. According to this table, the average annual production was 39 cavan or 1.7 ton with 1 Caban(= 44 kg)in the husk. If converted from this seedrice tonnage with 55% assumed for the yield rate of hulling, the weight of cleaned rice is about 1 ton, far below Japan's 4.7 tons (in terms of polished rice, 1973).

Rice can be grown here at any time of the year if stable supply of water is secured. In the vicinity of the project site, rice planting and rice plant reaping can be seen at the same time here and there is the paddy fields. To cultivate rice, it takes about 4 months from the planting of young rice plants to the harvest. In areas along the Midstream Cagayan, the wet season starts somewhere around May, when aquatic rice is planted in nonirrigated paddy fields. In irrigated farmfields, crops are raised twice a year, and the transplantation of young rice plants is also done in this season (wet-season irrigation). In rain-fed rice paddies, which presently represent the great majority of farmland here, the start of cultivation coincides with the beginning of the rainy season because there is no provision for irrigation, and the crop is harvested as the dry season comes. After the harvest of rice, such crops as corn, peanut and tobacco are raised in a small quarter of the rain-fed field from the dry season to the early wet season. The irigated paddies are famred starting in rainy June and ending in October for the first crop; and from dry December to the next March for the second crop. Since the latter phase of the first crop falls in October, the harvests are often damaged by typhonns and floods (see Fig. 2-5-10).

3) Land exploitation

According to agricultural statistics for 1971 (Table 2-5-33), the total area of exploited lands in Nueva Vizcaya P.V. (inclusive of Quirino Subprovince) is 58,913 ha, or 8.5% of the whole area, of which 34,060 ha (57.8%) is used for single-year crops. In Isabela P.V., the total area of used lands is 235,356 ha, or 22.1% of the entire area, of which 69.8% is farmed for raising single-year products. In the past 10 years, the percentage of unused lands has decreased and areas of grazing lands and grasslands increased.

① Number of farmhouses by farmlands

In the past decade, the number of farmhouses has increased by as much as 25% to 20,287 in Nueva Vizcaya P.V. (including Quirino Subprovince), and by 10% to 69,704 in Isabela P.V. As shown in Table 2-5-34, more than half of the farmhouses individually have 1 to 3 ha of farm fields.

② Irrigation

Of the 20,287 farmhouses in Nueva Vizcaya P.V., 10,320 (50.8%) have their own irrigation facilities. The majority (82.8%) of the farming families take water from natural streams, and the rest use such equipment as pumps.

Of the 69,704 farming households in Isabela P.V.. 20,621 (29.6%) have provisions for irrigation; 73.9% of these farmhouses emply a method of natural watering, and the rest have some irrigating equipment.

Generally, 80% of the rice fields in this region rely on rain water. Though this survey failed to confirm to what extent the term of irrigation facility goes in this area, it might be said that

provision is still poor in terms of both scale and capacity, with the exception of an irrigation project area in Magat. In the plain areas, the water is led in from nearby creeks by means of small-scale I.S.U. (Irrigation Service Unit) or lifted by N.I.A. pumps. Since the service water does not reach very far, some fields must rely on plot-to-plot irrigation. Accordingly, there are many areas where irrigation is not available due to lack or uneven distribution of the water (Table 2-5-35).

4) Management and economy of agriculture

① Farm produce

From data of the agricultural statistics for 1971, the yield of agricultural products in this region is summarized in the following

Amount of Agricultural Products

| Province / Item | Nueva Vizcaya P.V. (W/ Quirino S.P.V.) | | Isavela P.V. | |
|---|---|---|---|---|
| | Pesos | % | Pesos | % |
| Farm produce | | | | |
| Palay (rice) | 39,645,838 | 70.3 | 123,354,605 | 65.9 |
| Shelled corn | 2,684,240 | 4.8 | 25,890,347 | 13.8 |
| Tobacco | | | 24,374,145 | 13.0 |
| Peanuts | 1,305,945 | 2.3 | 3,820,987 | 2.0 |
| Coffee | 3,427,843 | 6.1 | 1,985,733 | 1.1 |
| Banana | 1,992,407 | 3.5 | 2,664,497 | 1.4 |
| Camote | 2,228,872 | 4.0 | 138,626 | |
| Livestock | | | | |
| Carabao | 11,342,098 | | 13,162,617 | |
| Hog | 4,417,032 | | 3,217,304 | |
| Chicken | 1,214,124 | | 138,626 | |

The table below shows the figures calculated in terms of farmland (per ha), farmhouse, and population (per capita).

Yield by Area, by Farmhouse, and by Person

| | Nueva Vizcaya P.V. (W/ Quirino S.P.V.) | Isabela P.V. |
|---|---|---|
| Total produce (w/o livestock) | ₱56,418,000 (57,247 ha) | ₱187,281,000 (250,542 ha) |
| Per ha | ₱986 | ₱748 |
| Per farmhouse | ₱2,871 | ₱2,687 |
| Per capita | ₱450 | ₱440 |

The rate of owner farmers to total farmers is 56.1% in Nueva Vizcaya P.V., and 50.5% in Isabela P.V. The value of product by owner farmers ₱2,387 in the former province, and ₱2,428 in the latter. The next table lists production of rice crops.

Amount and Yield of Rice

| | | Nueva Vizcaya P.V. | Isabela P.V. |
|---|---|---|---|
| Rice crop | Yield | 1,733,813 cavans | 5,756,761 cavans |
| | Amount | ₱39,645,838 (70.3% of total produce | ₱123,354,605 (65.9% of total produce |
| Per farmhouse | | ₱2,254 | ₱2,510 |
| Per capita | Yield | 47 cavans | 41 cavans |
| | Amount | ₱1,072 | ₱870 |

(2) Fertilizer, insecticide and seedrice breeding

Of the 20,287 farmhouses in Nueva Vizcaya P.V., 6,649 (32.8%) are using chemical fertilizers. While in Isabela P.V., chemicals are used by only 26.5% or 18,443 out of the 69,704 farmhouses in Nueva Vizcaya P.V. the amount of chemical fertilizers used is 1,143 tons. As for chemical insecticides, only 7% and 11.8% of the total farmhouses are using such in Nueva Vizcaya P.V. and Isabela P.V., respectively. The amount of use is 358,746 gal. in Nueva Vizcaya P.V. Even though there is a possibility of increased production by the use of chemical fertilizers and insecticides, the amount in use is very small because of the region's low income status, and the resultant low buying power precludes the purchase of these chemicals. The select seedrice developed by the I.R.R. (Institute of Rice Research, Philippines), which has some deficiencies, including the plant's fragility and vulnerability to insect attack, is used by 34% and 28% of the farmers in Nueva Vizcaya P.V. and Isabela P.V., respectively. The use of the select seedrice amounts to 130,736 quantas. The rest of the farmhouse are still growing traditional rice plants (wakwak, for example).

(3) Land use by owner and tenant farmers

According to data of the agricultural statistics for 1971, the composition of the farmhouses, in terms of owners and tenants, is as shown in the table below. It is noted that the rate of tenant farmers is higher than imagined from the fact that an agricultural land law has been established.

Ownership of Farms

| Farmhouse | Nueva Vizcaya P.V. | | Isavela P.V. | |
|---|---|---|---|---|
| | Number of Farms | % | Number of Farms | % |
| Full owner | 11,388 | 56.2 | 35,171 | 50.5 |
| Port owners | 3,592 | 17.7 | 10,900 | 15.6 |
| Tenant farmers | 4,851 | 23.9 | 21,683 | 31.1 |
| Cash | 79 | | 152 | |
| Share of production | 3,764 | | 18,699 | |
| Fixed amount of production | 137 | | 867 | |
| Rent free | 781 | | 1,127 | |
| Others | | | 844 | |
| Other forms of land term tenures | 452 | 2.2 | 1,923 | 2.8 |
| Total | 20,287 | 100 | 69,704 | 100 |

④ Price of farm products and relevant materials

The descriptions hereunder summarize agricultural situations heard about at the office of farming reformation in Bayombong, the capital city of Nueva Vizcaya P.V.

i. Confirmed figures of agricultural statistics for 1971

Rice crops in Nueva Vizcaya P.V.

{Area of farm fields 25,303 ha
{Area of cultivation 36,981 ha

Rice crops in Isabela P.V.

| | |
|---|---|
| Area of farm fields | 1,030,927 ha |
| Area of cultivation | 1,417,343 ha |

ii. In the Philippines there is a project called "Masagana 99" (99 cavans per ha) designed by the Government for the promotion of rice production. The figure 99 is set as the ultimate objective of this project. At present, the produce is reportedly 60 cavans ha in the dry season, and 44 to 50 cavans/ha in the wet season.

iii. Fertilizers, etc.

| | | |
|---|---|---|
| a. | Ammonium phosphate 16-20-0 | 1 bag (40 kg) = ₱70 |
| b. | Urea | 1 bag (50 kg) = ₱83 |
| c. | Pesticides | 1 bag (60 kg) |
| d. | Hand-operated sprayer | ₱170 |

There is a system under which up to ₱1,200 per ha can be borrowed from the bank as a farming loan for the purchase of fertilizers and insecticides (monthly interest, 1%), Chemical fertilizers are used by 70% of all farmhouses in the province (this figure is inconsistent with that of the statics). Manual tractors are owned by 30% to 40% of the farmers. Trashing machines are co-owned by a very few wealthy farmhouses. As rent for use of

the thrasher, 6 cavans of rice must be payed for the thrasing of 100 cavans.

iv. Ex-farmhouse price of seedrice

₱1.1/kg

Wholesale price ₱1.2 - 1.5 /kg

Retail price of polished rice

₱2.0/kg

v. Charge for use of irrigation service water (paid by farmers, per ha)

| | Wet Season | Dry Season |
|---|---|---|
| National irrigation | 3 cavans | 3 cavans |
| Cooperative irrigation | 3 cavans | 4 cavans |

(2) Agriculture in the vicinity of the proposed damsite

1) Background of agriculture

To obtain information about the actual conditions and economy of agriculture in the neighborhood of the proposed damsite, a survey was conducted at the site and also the mayor's office was consulted. The results are summarized hereunder.

The number of farmhouses in Kasibu M.P. is 2,510 as shown in Table 2-5-36. Some inconsistency exists between the figures of the 1975 census and those announced in 1977 by the office of agricultural economy in Bayombong. The difference between these two statistical figures as to the

farmhouses may be explained by the fact that in this area the barrio population has been increasing in recent years and also that immigrants are coming in from Ifugao and other provinces.

2) Present situations of agriculture

The Tubo River, which flows through the Kasibu Valley, is the head stream of the Diduyon River. Probably because the geology of the river valley, the water looks brown. The stream is gentle, and the volume of water is not large. In the river valley, the Campote, Malabing, Kakidugen and Biyoy tributaries join the Diduyon mainstream. In the watershed of these rivers there are rice paddies, with those having irrigation facilities sighted here and there. In the ratio of some 50 to 50, there are also non-irrigated or rain-fed paddy fields. In the upland paddies, called kaingin, on the slopes of mountains, dry-land rice plants of traditional seeds are seen, and corn and camote are also cultivated. In the barrios including Siguem, Katarawan, Kamamasi and Belet, the survey team met with several farmers to ask questions about their farming. The results are summarized below.

(i) The age of householders is around 40, and the number of family members is 5 to 6.

(ii) The area of farmed fields varies from 0.25 ha to 0.75 ha, with the average being 0.5 ha. In mountain areas, and appreciable number of farmers own no rice paddies at all.

(iii) As for aquatic rice, I.R.R. select seeds including R8, R20, R28 and C4 are popularly used.

(iv) In kaingin, the upland paddies, rice of traditional seeds such as wakwak is cultivated.

(v) The yield of rice is usually 30 to 40 cavans per ha, amounting to ₱1,500.

(vi) The annual rice production is not sufficient to feed the entire population of this region. The supply is only to meet the demand of some 9 months, and the 3-month rice shortage is made up for by corn and camote (sweet potato).

(vii) Most of the farmhouses have 2 to 3 ha of kaingin, which is cleared by burning to rotate such crops as dry-land rice, corn, camote and beans. They also intercrop pineapple, papaya, banana, sugar cane, tobacco, coffee, etc.

(viii) Livestock raising is the only source of cash income. about 30% of all the farmhouses keep at least one carabao (water buffalo), and 60% breed up to 6 head of hogs. 20 to 40 chickens range freely in almost every farmyard. The chickins are raised not for eggs but as broilers. The farmers sell their hogs and chickens to buy such daily necessaries as clothes and food, and some articles of luxury. Adult hogs sell for ₱200 to ₱300 per head, and a chicken for ₱15.

(ix) In the paddy fields, planting and harvesting are generally done by group work of mutually assisting relatives or neighbors.

3) Planting area of farm produce (mainly rice)

Tables 2-5-37 through 2-5-41 summarize land exploitation, farming scale, number of farmhouses by owner and tenant, farm products, and produce by crops and livestock of 1977 in the Kasibu M.P. The table below lists the planting areas of farm produce (rice and corn).

Planting Area

(Unit : ha)

| Barrio | Rice (Palay) | | | | Corn | Area of farmland |
|---|---|---|---|---|---|---|
| | Irrigated | Burn-cleared, upland | Rainfall | Total | | |
| Alimit | 3 | 5 | 5 | 13 | 3 | 192 |
| Antutot | 6 | | | 6 | 7 | 30 |
| Belet | 8 | 15 | | 23 | 1 | 29.75 |
| Binogawan | | 6 | 4 | 10 | 2 | 166.5 |
| Biyoy | 7 | 43 | | 50 | 5 | 105 |
| Bua | 30 | 15 | | 45 | 5 | 90 |
| Camamasi | | 8 | 2 | 10 | 1.5 | 51.5 |
| Capisaan | 2 | 5 | 5 | 12 | 1 | 129 |
| Catarawan | 6 | | | 6 | 2 | 59 |
| Cordon | 150 | 100 | 40 | 290 | 20 | 560 |
| Dine | 10 | | | 10 | Semiannual 2 | 24.5 |
| Didipio | 5 | 10 | | 15 | 2 | 142 |
| Kakiduguen | 0.33 | | | 0.33 | 5 | 40.33 |
| Kinato | 70 | | | 70 | 10 | 90.5 |
| Lupa | 80 | | | 80 | 20 | 220 |
| Macalong | 120 | 15 | 20 | 155 | 16 | 391 |
| Malabing | | 20 | | 20 | Semiannual 30 | 72 |
| Muta | 19 | 10 | 15 | 44 | 8 | 112 |
| Nantawacan | 20 | 65 | | 85 | 0 | 200 |
| Pao | 17 | 80 | | 97 | 1 | 263 |
| Papaya | 7 | 1 | 3 | 11 | | 18.5 |
| Pob.alloy | 25 | 40 | 30 | 95 | 15 | 152 |
| Pudi | 5 | 10 | | 15 | 2 | 90 |
| Siguem | 50 | 20 | | 70 | 2 | 202 |
| Tadji | 3 | 10 | | 13 | 7 | 108 |
| Tukod | 3 | 6 | | 9 | 10 | 89 |
| Wangal | 12 | 10 | | 22 | 5 | 104 |
| Watwat | 55 | 7 | 5 | 67 | Semiannual 20 | 167 |
| Total | 713.33 | 501 | 124 | 1,343 | 202.5 | 3,899 |

Source : The above data was obtained through hearings at the office of Agricultural Economy in Bayombong, the capital city of Nueva Vizucaya P.V.

Besides the aforementioned rice crop, other farm products were reported in the province:

| Item | Product | Remark |
|---|---|---|
| Other agricultural products | (ha) | |
| Camote | 884 | Upland field/ Kaingin |
| Banana | 533 | |
| Ginger | 227 | |
| Beans | 230 | |
| Pumpkin | 244 | |
| Coffee | 299 | |
| Gabi | 3 | |
| Livestock | (head) | |
| Carabao | 1,144 | |
| Cow | 104 | |
| Horse | 127 | |
| Hog | 3,605 | |
| Goat | 47 | |
| Chicken | 16,919 | |
| Duck | 1,417 | |

The following figures were also provided by Secretary V.B. Guiaden of the district office.

(i) The average annual income of a farmhouse is ₱1,800. With ₱1,000 assumed as the cash income obtained

by selling livestock, the ratio of spendings of this household is as follwos:

| | | | |
|---|---|---|---|
| Foodstuff | ₱400, | Education | ₱100 |
| Clothing | ₱150, | Transportation | ₱100 |
| Medical care | ₱150, | Social and others | ₱100 |

Remarks: Funeral expense ₱400 - ₱1,500

Wedding expense ₱1,000 (normal) - ₱2,000 (Ilocano tribe)

The native people of Kasibu are gemerally modest in spending for these ceremonial occasions. However, the ceremonies of some of the other tribes are said to be so elaborate that the expenditure results in the cost being in debt for several years.

(ii) The Kasibu M.P. lies in the 5th tax precinct. The annual tax revenue is ₱96,000. The ratio of income tax is as low as 0.1%. First class irrigated farmland is taxed at ₱24 per ha, and 1st class burn-cleared upland fields are levied a tax of ₱16 per ha. The finances of this village are managed by annual revenues of ₱158,000.

| | |
|---|---|
| Tax | ₱ 96,000 |
| Subsidy from Central Government | ₱62,000 |
| Total | ₱158,000 |

4) Family finances of farmhouses

Based on the results of hearings at the Kasibu district office and interviews with several farmers, a typical farmhouse of this region is assumed for trial calculations