

表 9.2 事業便益内訳

| Area             | Cropping Season  | Project Area (ha) | With Project Condition |                           |                              |                             | Without Project Condition |                           |                              |                             | Incremental Benefit (Rs.million) |
|------------------|------------------|-------------------|------------------------|---------------------------|------------------------------|-----------------------------|---------------------------|---------------------------|------------------------------|-----------------------------|----------------------------------|
|                  |                  |                   | Cultivated Area (ha)   | Gross Income (Rs.million) | Production Cost (Rs.million) | Primary Profit (Rs.million) | Cultivated Area (ha)      | Gross Income (Rs.million) | Production Cost (Rs.million) | Primary Profit (Rs.million) |                                  |
| 1 Sarojini Nagar | Kharif           | 14,862            | 14,862                 | 148.1                     | 42.7                         | 105.4                       | 9,237                     | 62.6                      | 23.2                         | 39.4                        | 66.0                             |
|                  | Rabi             | 14,862            | 14,862                 | 164.2                     | 37.1                         | 127.1                       | 9,275                     | 76.3                      | 21.4                         | 54.9                        | 72.1                             |
|                  | Annual           |                   |                        | 312.2                     | 79.8                         | 232.4                       |                           | 138.9                     | 44.6                         | 94.3                        | 138.2                            |
| 2 Sataon         | Kharif           | 12,874            | 12,874                 | 128.2                     | 38.7                         | 89.5                        | 7,274                     | 51.7                      | 26.2                         | 25.5                        | 64.0                             |
|                  | Rabi             | 12,874            | 12,874                 | 142.2                     | 34.3                         | 107.9                       | 9,006                     | 78.7                      | 22.6                         | 56.1                        | 51.8                             |
|                  | Annual           |                   |                        | 270.5                     | 73.0                         | 197.4                       |                           | 130.4                     | 48.7                         | 81.7                        | 115.8                            |
| 3 Sursa          | Kharif           | 17,313            | 16,880                 | 161.7                     | 45.6                         | 116.1                       | 9,834                     | 68.5                      | 23.0                         | 45.5                        | 70.6                             |
|                  | Rabi             | 16,880            | 16,880                 | 180.1                     | 40.3                         | 139.8                       | 13,280                    | 125.7                     | 30.9                         | 94.9                        | 44.9                             |
|                  | Perennial Annual | 433               | 433                    | 5.4                       | 2.5                          | 2.9                         | 960                       | 10.3                      | 5.1                          | 5.2                         | -2.3                             |
|                  |                  |                   |                        | 347.2                     | 88.3                         | 258.8                       |                           | 204.6                     | 59.0                         | 145.6                       | 113.2                            |
| 4 Purwa          | Kharif           | 12,252            | 12,252                 | 121.4                     | 34.6                         | 86.8                        | 6,638                     | 51.9                      | 16.9                         | 35.0                        | 51.8                             |
|                  | Rabi             | 12,252            | 12,252                 | 135.3                     | 29.5                         | 105.8                       | 6,735                     | 48.9                      | 12.7                         | 36.3                        | 69.5                             |
|                  | Annual           |                   |                        | 256.7                     | 64.1                         | 192.6                       |                           | 100.9                     | 29.6                         | 71.3                        | 121.3                            |
| Total            |                  | 57,301            | 57,301                 | 1186.6                    | 305.3                        | 881.3                       | 32,983                    | 574.7                     | 181.9                        | 392.8                       | 488.5                            |

表 9.3 事業評価結果 (1/5)

Area: 14,862 ha  
IRR: 19.2%

Unit: Rs.1,000

| Year in<br>Order | Year | Costs        |       |             | Total   | Incremental<br>Benefit | Balance  |
|------------------|------|--------------|-------|-------------|---------|------------------------|----------|
|                  |      | Construction | O&M   | Replacement |         |                        |          |
| 1                | 1993 | 17,985       |       |             | 17,985  |                        | -17,985  |
| 2                | 1994 | 38,003       |       |             | 38,003  |                        | -38,003  |
| 3                | 1995 | 91,472       |       |             | 91,472  | 1,106                  | -90,366  |
| 4                | 1996 | 134,567      |       |             | 134,567 | 7,739                  | -126,828 |
| 5                | 1997 | 107,257      |       |             | 107,257 | 22,112                 | -85,145  |
| 6                | 1998 | 75,244       |       |             | 75,244  | 44,224                 | -31,020  |
| 7                | 1999 |              | 6,410 |             | 6,410   | 71,864                 | 65,454   |
| 8                | 2000 |              | 6,410 |             | 6,410   | 98,398                 | 91,988   |
| 9                | 2001 |              | 6,410 |             | 6,410   | 119,405                | 112,995  |
| 10               | 2002 |              | 6,410 |             | 6,410   | 132,672                | 126,262  |
| 11               | 2003 |              | 6,410 | 1,744       | 8,154   | 138,200                | 130,046  |
| 12               | 2004 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 13               | 2005 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 14               | 2006 |              | 6,410 | 16          | 6,426   | 138,200                | 131,774  |
| 15               | 2007 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 16               | 2008 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 17               | 2009 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 18               | 2010 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 19               | 2011 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 20               | 2012 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 21               | 2013 |              | 6,410 | 1,744       | 8,154   | 138,200                | 130,046  |
| 22               | 2014 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 23               | 2015 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 24               | 2016 |              | 6,410 | 16          | 6,426   | 138,200                | 131,774  |
| 25               | 2017 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 26               | 2018 |              | 6,410 | 10,348      | 16,758  | 138,200                | 121,442  |
| 27               | 2019 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 28               | 2020 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 29               | 2021 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 30               | 2022 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 31               | 2023 |              | 6,410 | 1,744       | 8,154   | 138,200                | 130,046  |
| 32               | 2024 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 33               | 2025 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 34               | 2026 |              | 6,410 | 16          | 6,426   | 138,200                | 131,774  |
| 35               | 2027 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 36               | 2028 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 37               | 2029 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 38               | 2030 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 39               | 2031 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 40               | 2032 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 41               | 2033 |              | 6,410 | 1,744       | 8,154   | 138,200                | 130,046  |
| 42               | 2034 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 43               | 2035 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 44               | 2036 |              | 6,410 | 16          | 6,426   | 138,200                | 131,774  |
| 45               | 2037 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 46               | 2038 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 47               | 2039 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 48               | 2040 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 49               | 2041 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |
| 50               | 2042 |              | 6,410 |             | 6,410   | 138,200                | 131,790  |

表 9.3 事業評価結果 (2/5)

Area: 12,874 ha  
IRR: 13.7%

Unit: Rs.1,000

| Year in<br>Order | Year | Costs        |                 |         | Incremental |          |         |
|------------------|------|--------------|-----------------|---------|-------------|----------|---------|
|                  |      | Construction | O&M Replacement | Total   | Benefit     | Balance  |         |
| 1                | 1993 | 15,579       |                 | 15,579  |             | -15,579  |         |
| 2                | 1994 | 41,306       |                 | 41,306  |             | -41,306  |         |
| 3                | 1995 | 116,997      |                 | 116,997 | 926         | -116,071 |         |
| 4                | 1996 | 169,064      |                 | 169,064 | 6,485       | -162,579 |         |
| 5                | 1997 | 144,534      |                 | 144,534 | 18,528      | -126,006 |         |
| 6                | 1998 | 100,806      |                 | 100,806 | 37,056      | -63,750  |         |
| 7                | 1999 |              | 9,020           | 9,020   | 60,216      | 51,196   |         |
| 8                | 2000 |              | 9,020           | 9,020   | 82,450      | 73,430   |         |
| 9                | 2001 |              | 9,020           | 9,020   | 100,051     | 91,031   |         |
| 10               | 2002 |              | 9,020           | 9,020   | 111,168     | 102,148  |         |
| 11               | 2003 |              | 9,020           | 1,512   | 10,532      | 115,800  | 105,268 |
| 12               | 2004 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 13               | 2005 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 14               | 2006 |              | 9,020           | 200     | 9,220       | 115,800  | 106,580 |
| 15               | 2007 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 16               | 2008 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 17               | 2009 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 18               | 2010 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 19               | 2011 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 20               | 2012 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 21               | 2013 |              | 9,020           | 1,512   | 10,532      | 115,800  | 105,268 |
| 22               | 2014 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 23               | 2015 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 24               | 2016 |              | 9,020           | 200     | 9,220       | 115,800  | 106,580 |
| 25               | 2017 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 26               | 2018 |              | 9,020           | 13,230  | 22,250      | 115,800  | 93,550  |
| 27               | 2019 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 28               | 2020 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 29               | 2021 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 30               | 2022 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 31               | 2023 |              | 9,020           | 1,512   | 10,532      | 115,800  | 105,268 |
| 32               | 2024 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 33               | 2025 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 34               | 2026 |              | 9,020           | 200     | 9,220       | 115,800  | 106,580 |
| 35               | 2027 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 36               | 2028 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 37               | 2029 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 38               | 2030 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 39               | 2031 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 40               | 2032 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 41               | 2033 |              | 9,020           | 1,512   | 10,532      | 115,800  | 105,268 |
| 42               | 2034 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 43               | 2035 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 44               | 2036 |              | 9,020           | 200     | 9,220       | 115,800  | 106,580 |
| 45               | 2037 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 46               | 2038 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 47               | 2039 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 48               | 2040 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 49               | 2041 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |
| 50               | 2042 |              | 9,020           |         | 9,020       | 115,800  | 106,780 |

表 9.3 事業評価結果 (3/5)

Area: 17,313 ha  
IRR: 12.0%

Unit: Rs.1,000

| Year in<br>Order | Year | Costs        |        |             | Total   | Incremental<br>Benefit | Balance  |
|------------------|------|--------------|--------|-------------|---------|------------------------|----------|
|                  |      | Construction | O&M    | Replacement |         |                        |          |
| 1                | 1993 | 20,951       |        |             | 20,951  |                        | -20,951  |
| 2                | 1994 | 46,836       |        |             | 46,836  |                        | -46,836  |
| 3                | 1995 | 125,357      |        |             | 125,357 | 906                    | -124,451 |
| 4                | 1996 | 198,026      |        |             | 198,026 | 6,339                  | -191,687 |
| 5                | 1997 | 155,925      |        |             | 155,925 | 18,112                 | -137,813 |
| 6                | 1998 | 95,086       |        |             | 95,086  | 36,224                 | -58,862  |
| 7                | 1999 |              | 11,440 |             | 11,440  | 58,864                 | 47,424   |
| 8                | 2000 |              | 11,440 |             | 11,440  | 80,598                 | 69,158   |
| 9                | 2001 |              | 11,440 |             | 11,440  | 97,805                 | 86,365   |
| 10               | 2002 |              | 11,440 |             | 11,440  | 108,672                | 97,232   |
| 11               | 2003 |              | 11,440 | 2,032       | 13,472  | 113,200                | 99,728   |
| 12               | 2004 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 13               | 2005 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 14               | 2006 |              | 11,440 | 7,250       | 18,690  | 113,200                | 94,510   |
| 15               | 2007 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 16               | 2008 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 17               | 2009 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 18               | 2010 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 19               | 2011 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 20               | 2012 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 21               | 2013 |              | 11,440 | 2,032       | 13,472  | 113,200                | 99,728   |
| 22               | 2014 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 23               | 2015 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 24               | 2016 |              | 11,440 | 7,250       | 18,690  | 113,200                | 94,510   |
| 25               | 2017 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 26               | 2018 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 27               | 2019 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 28               | 2020 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 29               | 2021 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 30               | 2022 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 31               | 2023 |              | 11,440 | 2,032       | 13,472  | 113,200                | 99,728   |
| 32               | 2024 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 33               | 2025 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 34               | 2026 |              | 11,440 | 7,250       | 18,690  | 113,200                | 94,510   |
| 35               | 2027 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 36               | 2028 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 37               | 2029 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 38               | 2030 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 39               | 2031 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 40               | 2032 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 41               | 2033 |              | 11,440 | 2,032       | 13,472  | 113,200                | 99,728   |
| 42               | 2034 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 43               | 2035 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 44               | 2036 |              | 11,440 | 7,250       | 18,690  | 113,200                | 94,510   |
| 45               | 2037 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 46               | 2038 |              | 11,440 | 7,234       | 18,674  | 113,200                | 94,526   |
| 47               | 2039 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 48               | 2040 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 49               | 2041 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |
| 50               | 2042 |              | 11,440 |             | 11,440  | 113,200                | 101,760  |

表 9.3 事業評価結果 (4/5)

Area: 12,252 ha  
IRR: 18.4%

Unit: Rs.1,000

| Year in<br>Order | Year | Costs        |                 |         | Incremental |          |         |
|------------------|------|--------------|-----------------|---------|-------------|----------|---------|
|                  |      | Construction | O&M Replacement | Total   | Benefit     | Balance  |         |
| 1                | 1993 | 14,827       |                 | 14,827  |             | -14,827  |         |
| 2                | 1994 | 32,215       |                 | 32,215  |             | -32,215  |         |
| 3                | 1995 | 83,993       |                 | 83,993  | 970         | -83,023  |         |
| 4                | 1996 | 126,580      |                 | 126,580 | 6,793       | -119,787 |         |
| 5                | 1997 | 102,329      |                 | 102,329 | 19,408      | -82,921  |         |
| 6                | 1998 | 69,483       |                 | 69,483  | 38,816      | -30,667  |         |
| 7                | 1999 |              | 6,500           | 6,500   | 63,076      | 56,576   |         |
| 8                | 2000 |              | 6,500           | 6,500   | 86,366      | 79,866   |         |
| 9                | 2001 |              | 6,500           | 6,500   | 104,803     | 98,303   |         |
| 10               | 2002 |              | 6,500           | 6,500   | 116,448     | 109,948  |         |
| 11               | 2003 |              | 6,500           | 1,440   | 7,940       | 121,300  | 113,360 |
| 12               | 2004 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 13               | 2005 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 14               | 2006 |              | 6,500           | 2,020   | 8,520       | 121,300  | 112,780 |
| 15               | 2007 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 16               | 2008 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 17               | 2009 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 18               | 2010 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 19               | 2011 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 20               | 2012 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 21               | 2013 |              | 6,500           | 1,440   | 7,940       | 121,300  | 113,360 |
| 22               | 2014 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 23               | 2015 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 24               | 2016 |              | 6,500           | 2,020   | 8,520       | 121,300  | 112,780 |
| 25               | 2017 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 26               | 2018 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 27               | 2019 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 28               | 2020 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 29               | 2021 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 30               | 2022 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 31               | 2023 |              | 6,500           | 1,440   | 7,940       | 121,300  | 113,360 |
| 32               | 2024 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 33               | 2025 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 34               | 2026 |              | 6,500           | 2,020   | 8,520       | 121,300  | 112,780 |
| 35               | 2027 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 36               | 2028 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 37               | 2029 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 38               | 2030 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 39               | 2031 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 40               | 2032 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 41               | 2033 |              | 6,500           | 1,440   | 7,940       | 121,300  | 113,360 |
| 42               | 2034 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 43               | 2035 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 44               | 2036 |              | 6,500           | 2,020   | 8,520       | 121,300  | 112,780 |
| 45               | 2037 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 46               | 2038 |              | 6,500           | 1,996   | 8,496       | 121,300  | 112,804 |
| 47               | 2039 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 48               | 2040 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 49               | 2041 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |
| 50               | 2042 |              | 6,500           |         | 6,500       | 121,300  | 114,800 |

表 9.3 事業評価結果 (5/5)

Area: 57,301 ha  
IRR: 15.5%

Unit: Rs.1,000

| Year in<br>Order | Year | Costs        |                 |         | Incremental |          |         |
|------------------|------|--------------|-----------------|---------|-------------|----------|---------|
|                  |      | Construction | O&M Replacement | Total   | Benefit     | Balance  |         |
| 1                | 1993 | 69,342       |                 | 69,342  |             | -69,342  |         |
| 2                | 1994 | 158,360      |                 | 158,360 |             | -158,360 |         |
| 3                | 1995 | 417,819      |                 | 417,819 | 3,908       | -413,911 |         |
| 4                | 1996 | 628,237      |                 | 628,237 | 27,356      | -600,881 |         |
| 5                | 1997 | 510,045      |                 | 510,045 | 78,160      | -431,885 |         |
| 6                | 1998 | 340,619      |                 | 340,619 | 156,320     | -184,299 |         |
| 7                | 1999 |              | 33,370          | 33,370  | 254,020     | 220,650  |         |
| 8                | 2000 |              | 33,370          | 33,370  | 347,812     | 314,442  |         |
| 9                | 2001 |              | 33,370          | 33,370  | 422,064     | 388,694  |         |
| 10               | 2002 |              | 33,370          | 33,370  | 468,960     | 435,590  |         |
| 11               | 2003 |              | 33,370          | 6,728   | 40,098      | 488,500  | 448,402 |
| 12               | 2004 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 13               | 2005 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 14               | 2006 |              | 33,370          | 9,486   | 42,856      | 488,500  | 445,644 |
| 15               | 2007 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 16               | 2008 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 17               | 2009 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 18               | 2010 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 19               | 2011 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 20               | 2012 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 21               | 2013 |              | 33,370          | 6,728   | 40,098      | 488,500  | 448,402 |
| 22               | 2014 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 23               | 2015 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 24               | 2016 |              | 33,370          | 9,486   | 42,856      | 488,500  | 445,644 |
| 25               | 2017 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 26               | 2018 |              | 33,370          | 32,808  | 66,178      | 488,500  | 422,322 |
| 27               | 2019 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 28               | 2020 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 29               | 2021 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 30               | 2022 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 31               | 2023 |              | 33,370          | 6,728   | 40,098      | 488,500  | 448,402 |
| 32               | 2024 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 33               | 2025 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 34               | 2026 |              | 33,370          | 9,486   | 42,856      | 488,500  | 445,644 |
| 35               | 2027 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 36               | 2028 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 37               | 2029 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 38               | 2030 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 39               | 2031 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 40               | 2032 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 41               | 2033 |              | 33,370          | 6,728   | 40,098      | 488,500  | 448,402 |
| 42               | 2034 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 43               | 2035 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 44               | 2036 |              | 33,370          | 9,486   | 42,856      | 488,500  | 445,644 |
| 45               | 2037 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 46               | 2038 |              | 33,370          | 9,230   | 42,600      | 488,500  | 445,900 |
| 47               | 2039 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 48               | 2040 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 49               | 2041 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |
| 50               | 2042 |              | 33,370          |         | 33,370      | 488,500  | 455,130 |

表 9.4 事業の資金繰り表

Unit: Rs. Million

| Year Order | Year in | Project | Cash Outflow |          |                  |          |                |         | Cash Inflow       |              |                   |                    |              |                  | Total Inflow (B) | Balance (B)-(A) | Accumulated Loan |
|------------|---------|---------|--------------|----------|------------------|----------|----------------|---------|-------------------|--------------|-------------------|--------------------|--------------|------------------|------------------|-----------------|------------------|
|            |         |         | Cost         | O&M Cost | Replacement Cost | Interest | Loan Repayment | Loan    | Total Outflow (A) | Foreign Loan | Government Budget | Government Subsidy | Water Charge | Total Inflow (B) |                  |                 |                  |
| 1993       | 1       | 80.0    | 0.0          | 0.0      | 0.0              | 1.6      | 0.0            | 0.0     | 81.6              | 64.0         | 16.0              | 1.6                | 0.0          | 81.6             | 0.0              | 64.0            |                  |
| 1994       | 2       | 208.9   | 0.0          | 0.0      | 0.0              | 5.8      | 0.0            | 0.0     | 214.7             | 167.1        | 41.8              | 5.8                | 0.0          | 214.7            | 0.0              | 231.1           |                  |
| 1995       | 3       | 615.3   | 1.6          | 0.0      | 0.0              | 18.1     | 0.0            | 0.0     | 635.0             | 492.3        | 123.1             | 18.1               | 1.6          | 635.0            | 0.0              | 723.3           |                  |
| 1996       | 4       | 967.2   | 9.4          | 0.0      | 0.0              | 37.4     | 0.0            | 0.0     | 1,014.0           | 773.7        | 193.4             | 37.4               | 9.4          | 1,014.0          | 0.0              | 1,497.1         |                  |
| 1997       | 5       | 865.5   | 20.3         | 0.0      | 0.0              | 54.7     | 0.0            | 0.0     | 940.5             | 692.4        | 173.1             | 54.7               | 20.3         | 940.5            | 0.0              | 2,189.4         |                  |
| 1998       | 6       | 614.3   | 31.3         | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 712.6             | 491.4        | 122.9             | 67.0               | 31.3         | 712.6            | 0.0              | 2,680.8         |                  |
| 1999       | 7       | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2000       | 8       | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2001       | 9       | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2002       | 10      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2003       | 11      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2004       | 12      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2005       | 13      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2006       | 14      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2007       | 15      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2008       | 16      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2009       | 17      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2010       | 18      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2011       | 19      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2012       | 20      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2013       | 21      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2014       | 22      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2015       | 23      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2016       | 24      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2017       | 25      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2018       | 26      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2019       | 27      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2020       | 28      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2021       | 29      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| 2022       | 30      | 0.0     | 0.0          | 0.0      | 0.0              | 67.0     | 0.0            | 0.0     | 106.1             | 0.0          | 0.0               | 67.0               | 39.1         | 106.1            | 0.0              | 2,680.8         |                  |
| Total      |         | 3,351.1 | 1,001.0      | 111.4    | 1,726.1          | 2,680.8  | 8,870.4        | 2,680.8 | 670.2             | 4,518.4      | 1,001.0           | 8,870.4            | 0.0          | 8,870.4          | 0.0              | 0.0             |                  |

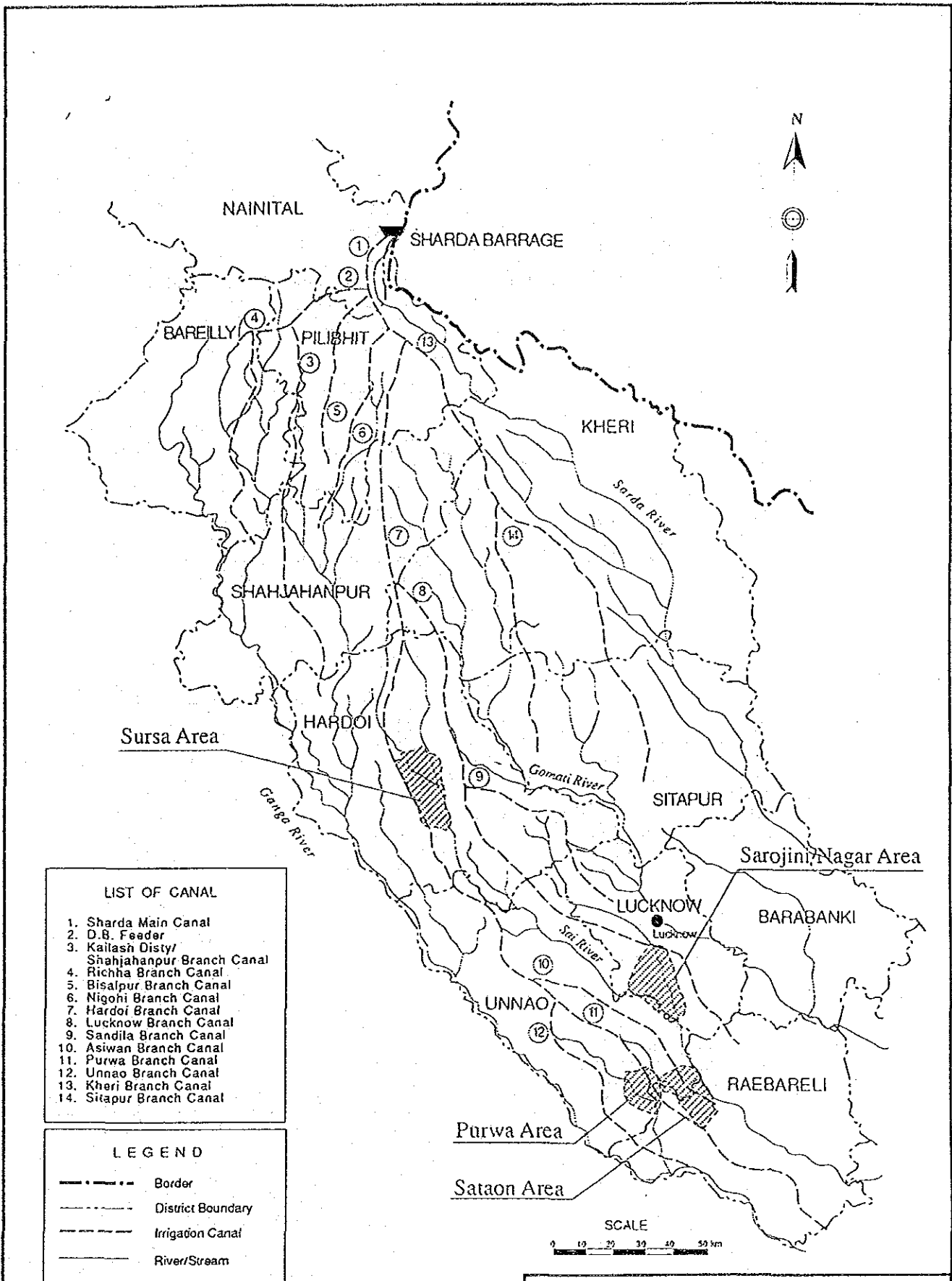
作業監理委員・調査団・インド国カウンターパート名簿

| Name                            | Position  |
|---------------------------------|---|
| <b>A. Advisory Committee</b>    |   |
| 1. Mr. N. Tsujii                | Chairman of Advisory Committee (MAFF)                     |
| 2. Mr. F. Seta                  | Member, Irrigation and Drainage (MAFF)                    |
| 3. Mr. K. Hara                  | Member, Agriculture (MAFF)                                |
| 4. Mr. A. Yamamoto              | Member, Project Evaluation (OECF)                         |
| <b>B. Study Team</b>            |   |
| 1. Dr. Y. Kunihiro              | Team Leader   |
| 2. Mr. H. Kuronuma              | Irrigation and Water Management Engineer (Co-team Leader) |
| 3. Mr. M. Kobayashi             | Drainage Engineer   |
| 4. Mr. N. Sambe                 | Meteo-Hydrologist   |
| 5. Mr. W. Suido                 | Hydrogeologist  |
| 6. Mr. K. Goto                  | Soil and Land Use Expert                                  |
| 7. Mr. K. Yamada                | Agronomist  |
| 8. Mr. P. K. Rao                | Agro-Economist  |
| 9. Mr. K. Kyoizumi              | Structural Planning and Design Engineer                   |
| 10. Mr. T. Kimijima             | Project Economist   |
| <b>C. Counterpart Personnel</b> |   |
| 1. Sri. O. P. Chaturvedi        | Additional Director, CADA                                 |
| 2. Sri. M.C. Upreti             | Co-relator and Project Officer, CADA                      |
| 3. Sri. S.P. Srivastava         | Deputy Director, CADA                                     |
| 4. Sri. Mauglani                | Additional Registrar, CADA                                |
| 5. Sri. J. P. Garg              | Deputy Director, CADA                                     |
| 6. Sri. P. N. Misra             | Executive Engineer, Hardoi, Irrigation Department         |
| 7. Sri. Dhaneshwar Rai          | Senior Hydrologist, Groundwater Department                |



付 図





- LIST OF CANAL**
1. Sharda Main Canal
  2. D.B. Feeder
  3. Kailash Disty/ Shahjahanpur Branch Canal
  4. Richha Branch Canal
  5. Bisalpur Branch Canal
  6. Nigohi Branch Canal
  7. Hardoi Branch Canal
  8. Lucknow Branch Canal
  9. Sandila Branch Canal
  10. Asawan Branch Canal
  11. Purwa Branch Canal
  12. Unnao Branch Canal
  13. Kheri Branch Canal
  14. Sitapur Branch Canal

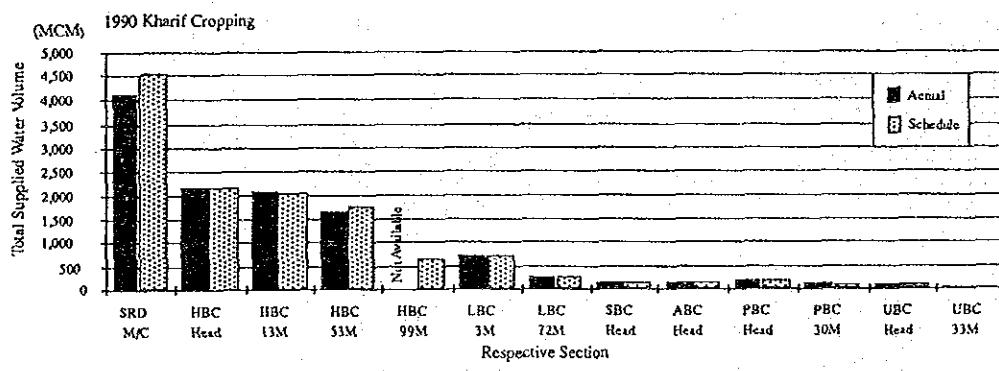
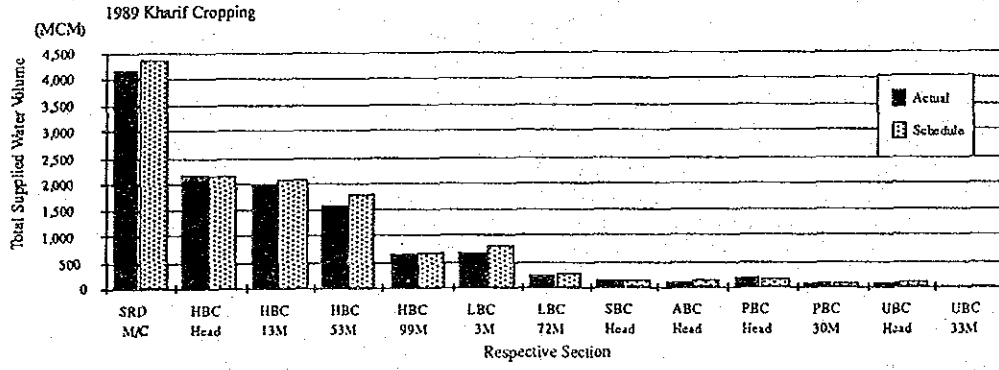
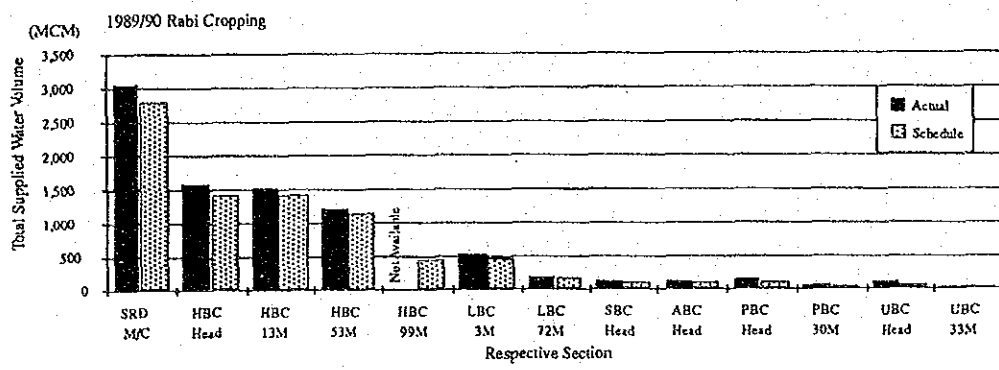
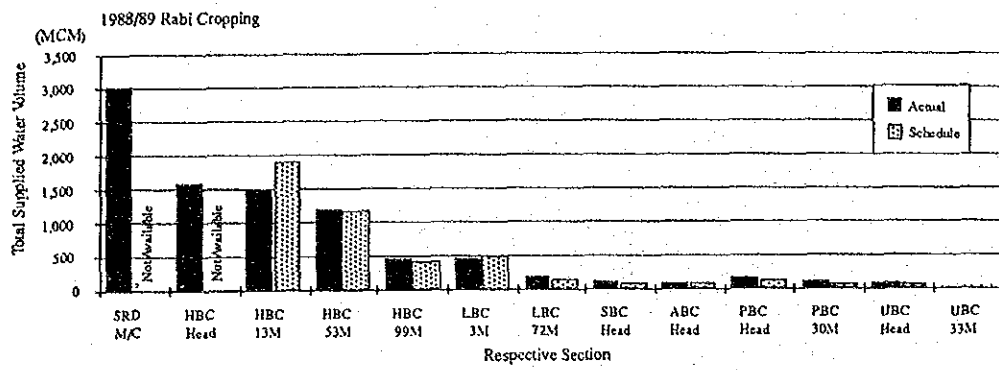
- LEGEND**
- Border
  - - - District Boundary
  - Irrigation Canal
  - River/Stream

INDIA

FEASIBILITY STUDY ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF  
SHARDA CANAL CAD PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY

図 3.1 シャルダ水路受益地における  
既存主要灌漑水路網



Remarks: HBC : Hardoi Branch Canal    LBC : Lucknow Branch Canal    SBC : Sandila Branch Canal  
 ABC : Asiwari Branch Canal    PBC : Purwa Branch Canal    UBC : Unnao Branch Canal

図 3.2 灌漑配水計画と実績の比較

INDIA

FEASIBILITY STUDY ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF  
SHARDA CANAL CAD PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY

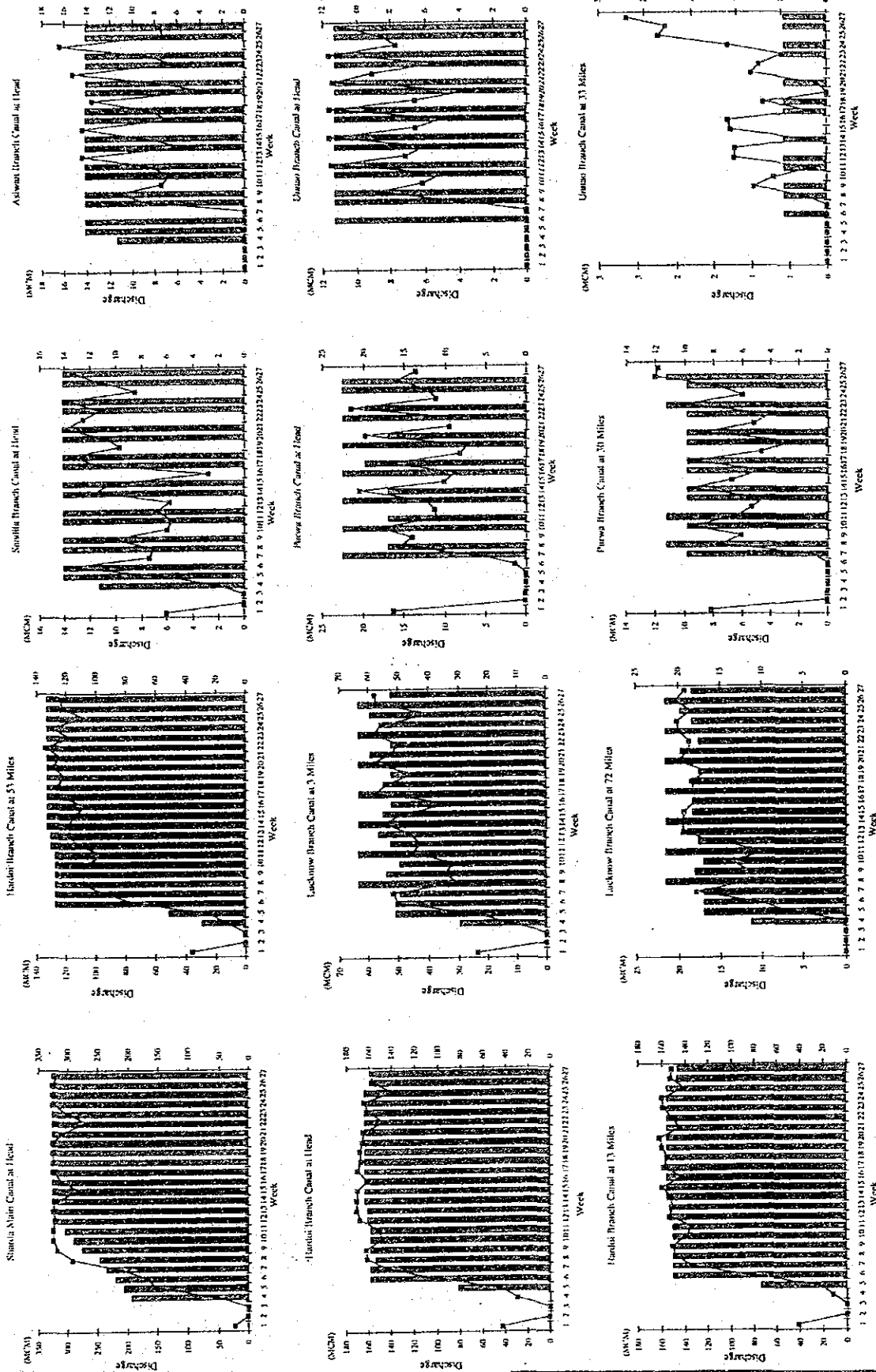


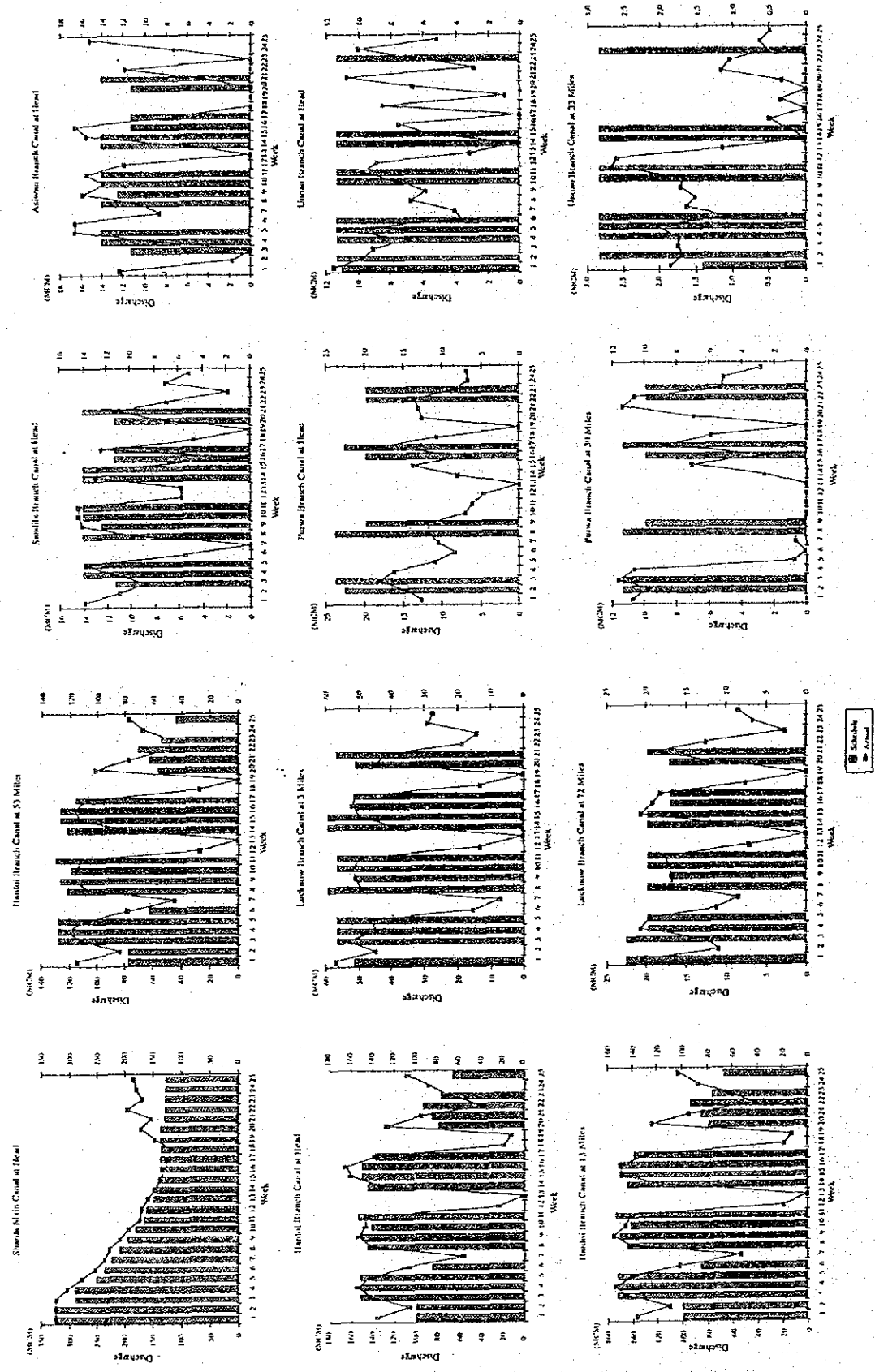
図 3.3 週単位の灌漑配水計画と実績の比較  
カリフ期(1/2)

INDIA

FEASIBILITY STUDY ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF  
SHARDA CANAL CAD PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY

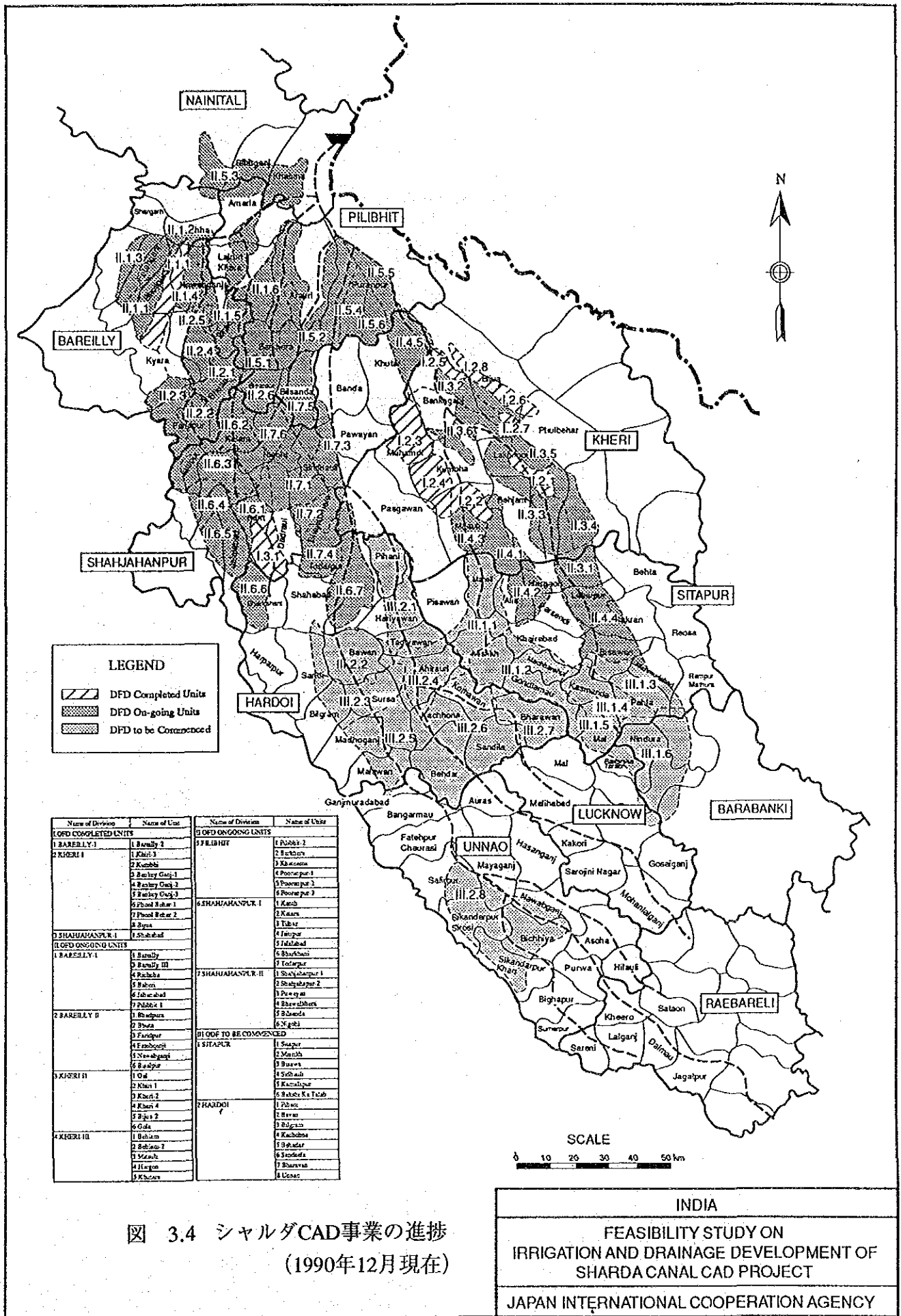
図 3.3 週単位の灌漑配水計画と実績の比較  
ラビ期 (2/2)



INDIA

FEASIBILITY STUDY ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF  
SHARDA CANAL CAD PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY



**LEGEND**

- DFD Completed Units
- DFD On-going Units
- DFD to be Commenced

| Name of Division           | Name of Unit      | Name of Division           | Name of Unit   |
|----------------------------|-------------------|----------------------------|----------------|
| <b>DFD COMPLETED UNITS</b> |                   | <b>DFD ON-GOING UNITS</b>  |                |
| 1 BAREILLY-I               | 1 Bareilly 2      | 1 Pilibhit                 | 1 Pilibhit 2   |
| 2 KHERI-I                  | 1 Kheri 3         | 2 Pilibhit                 | 2 Pilibhit 3   |
|                            | 2 Kheri 1         | 3 Kheri                    | 3 Kheri 1      |
|                            | 3 Bareilly Gazi-1 | 4 Pilibhit                 | 4 Pilibhit 1   |
|                            | 4 Bareilly Gazi-2 | 5 Pilibhit                 | 5 Pilibhit 2   |
|                            | 5 Bareilly Gazi-3 | 6 Pilibhit                 | 6 Pilibhit 3   |
|                            | 6 Pilibhit 1      | 7 Pilibhit                 | 7 Pilibhit 4   |
|                            | 7 Pilibhit 2      | 8 Pilibhit                 | 8 Pilibhit 5   |
|                            | 8 Pilibhit        | 9 Pilibhit                 | 9 Pilibhit 6   |
| 3 SHAHJAHANPUR-I           | 1 Shahjahanpur    | 6 SHAHJAHANPUR-I           | 1 Shahjahanpur |
| <b>DFD ON-GOING UNITS</b>  |                   | <b>DFD TO BE COMMENCED</b> |                |
| 1 BAREILLY-I               | 1 Bareilly I      | 1 SITAPUR                  | 1 Sitapur      |
|                            | 2 Bareilly II     | 2 Sitapur                  | 2 Sitapur      |
|                            | 3 Bareilly III    | 3 Sitapur                  | 3 Sitapur      |
|                            | 4 Bareilly        | 4 Sitapur                  | 4 Sitapur      |
|                            | 5 Bareilly        | 5 Sitapur                  | 5 Sitapur      |
|                            | 6 Bareilly        | 6 Sitapur                  | 6 Sitapur      |
|                            | 7 Bareilly        | 7 Sitapur                  | 7 Sitapur      |
|                            | 8 Bareilly        | 8 Sitapur                  | 8 Sitapur      |
| 2 BAREILLY-II              | 1 Bareilly        | 7 SHAHJAHANPUR-II          | 1 Shahjahanpur |
|                            | 2 Bareilly        | 2 Shahjahanpur             | 2 Shahjahanpur |
|                            | 3 Bareilly        | 3 Shahjahanpur             | 3 Shahjahanpur |
|                            | 4 Bareilly        | 4 Shahjahanpur             | 4 Shahjahanpur |
|                            | 5 Bareilly        | 5 Shahjahanpur             | 5 Shahjahanpur |
|                            | 6 Bareilly        | 6 Shahjahanpur             | 6 Shahjahanpur |
|                            | 7 Bareilly        | 7 Shahjahanpur             | 7 Shahjahanpur |
|                            | 8 Bareilly        | 8 Shahjahanpur             | 8 Shahjahanpur |
| 3 KHERI-II                 | 1 Kheri           | 8 SITAPUR                  | 1 Sitapur      |
|                            | 2 Kheri           | 2 Sitapur                  | 2 Sitapur      |
|                            | 3 Kheri           | 3 Sitapur                  | 3 Sitapur      |
|                            | 4 Kheri           | 4 Sitapur                  | 4 Sitapur      |
|                            | 5 Kheri           | 5 Sitapur                  | 5 Sitapur      |
|                            | 6 Kheri           | 6 Sitapur                  | 6 Sitapur      |
|                            | 7 Kheri           | 7 Sitapur                  | 7 Sitapur      |
|                            | 8 Kheri           | 8 Sitapur                  | 8 Sitapur      |
| 4 KHERI-III                | 1 Kheri           | 7 HARDOI                   | 1 HarDOI       |
|                            | 2 Kheri           | 2 HarDOI                   | 2 HarDOI       |
|                            | 3 Kheri           | 3 HarDOI                   | 3 HarDOI       |
|                            | 4 Kheri           | 4 HarDOI                   | 4 HarDOI       |
|                            | 5 Kheri           | 5 HarDOI                   | 5 HarDOI       |
|                            | 6 Kheri           | 6 HarDOI                   | 6 HarDOI       |
|                            | 7 Kheri           | 7 HarDOI                   | 7 HarDOI       |
|                            | 8 Kheri           | 8 HarDOI                   | 8 HarDOI       |

図 3.4 シャルダCAD事業の進捗  
(1990年12月現在)

INDIA

FEASIBILITY STUDY ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF  
SHARDA CANAL CAD PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY

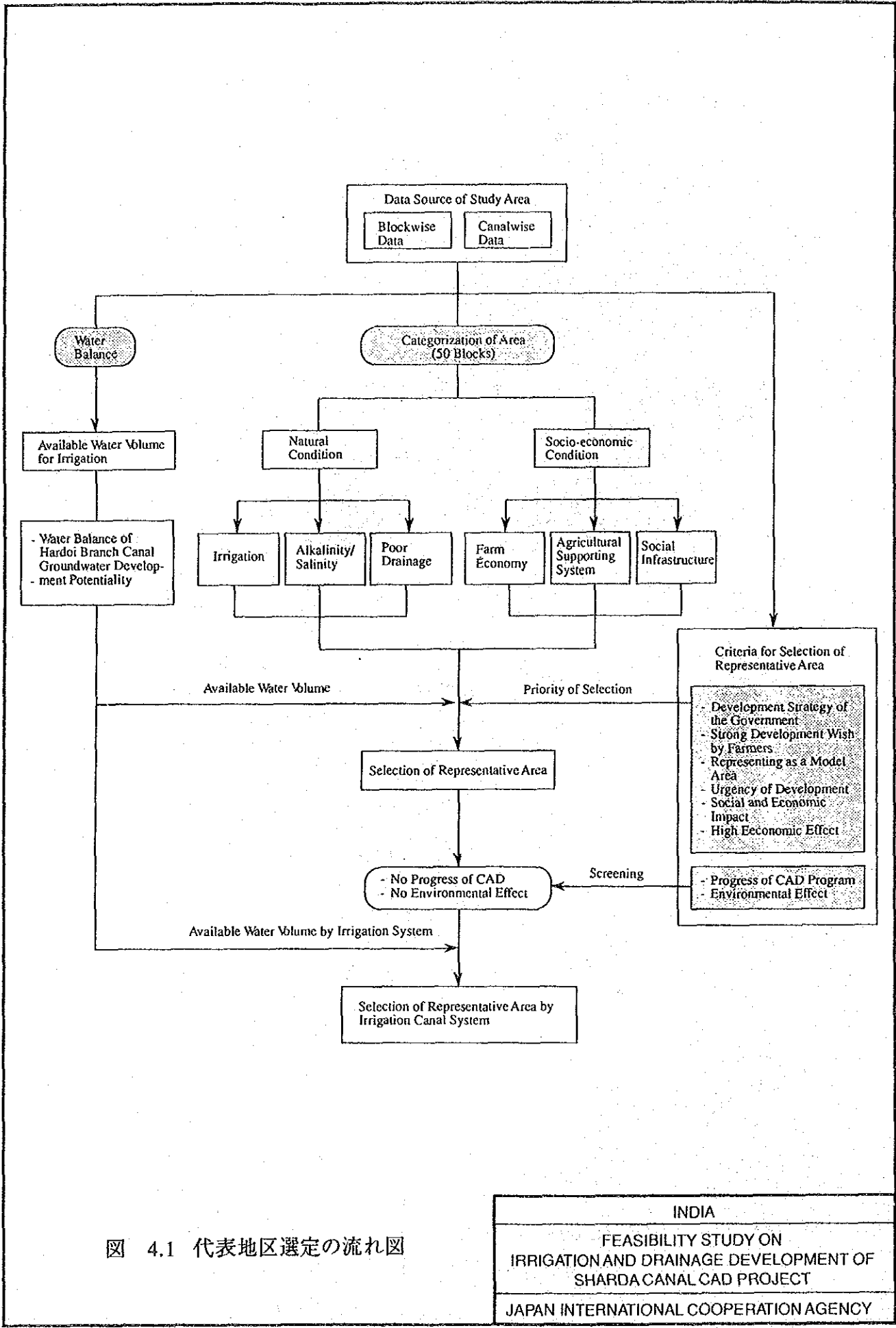


図 4.1 代表地区選定の流れ図



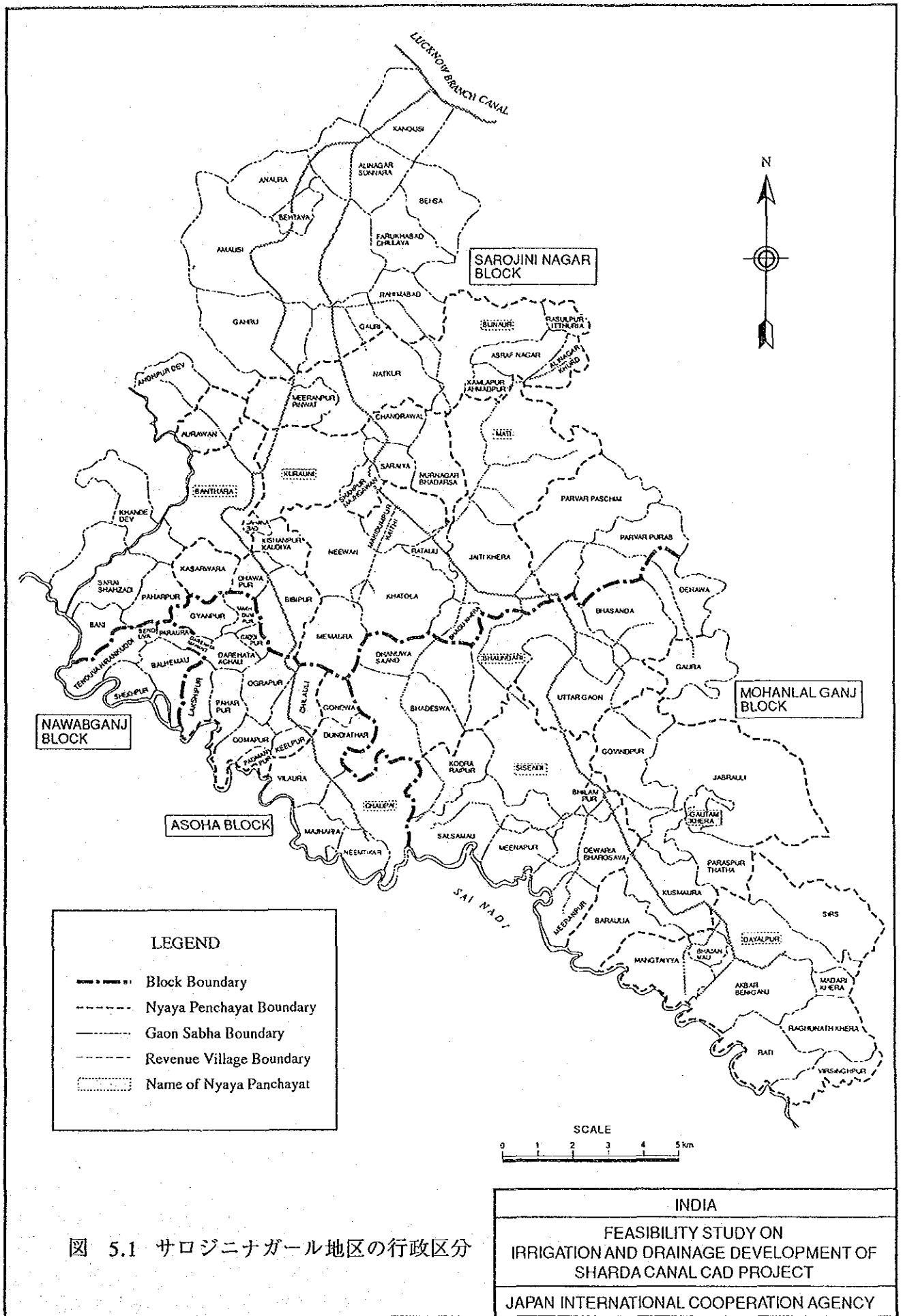


図 5.1 サロジニナガル地区の行政区分



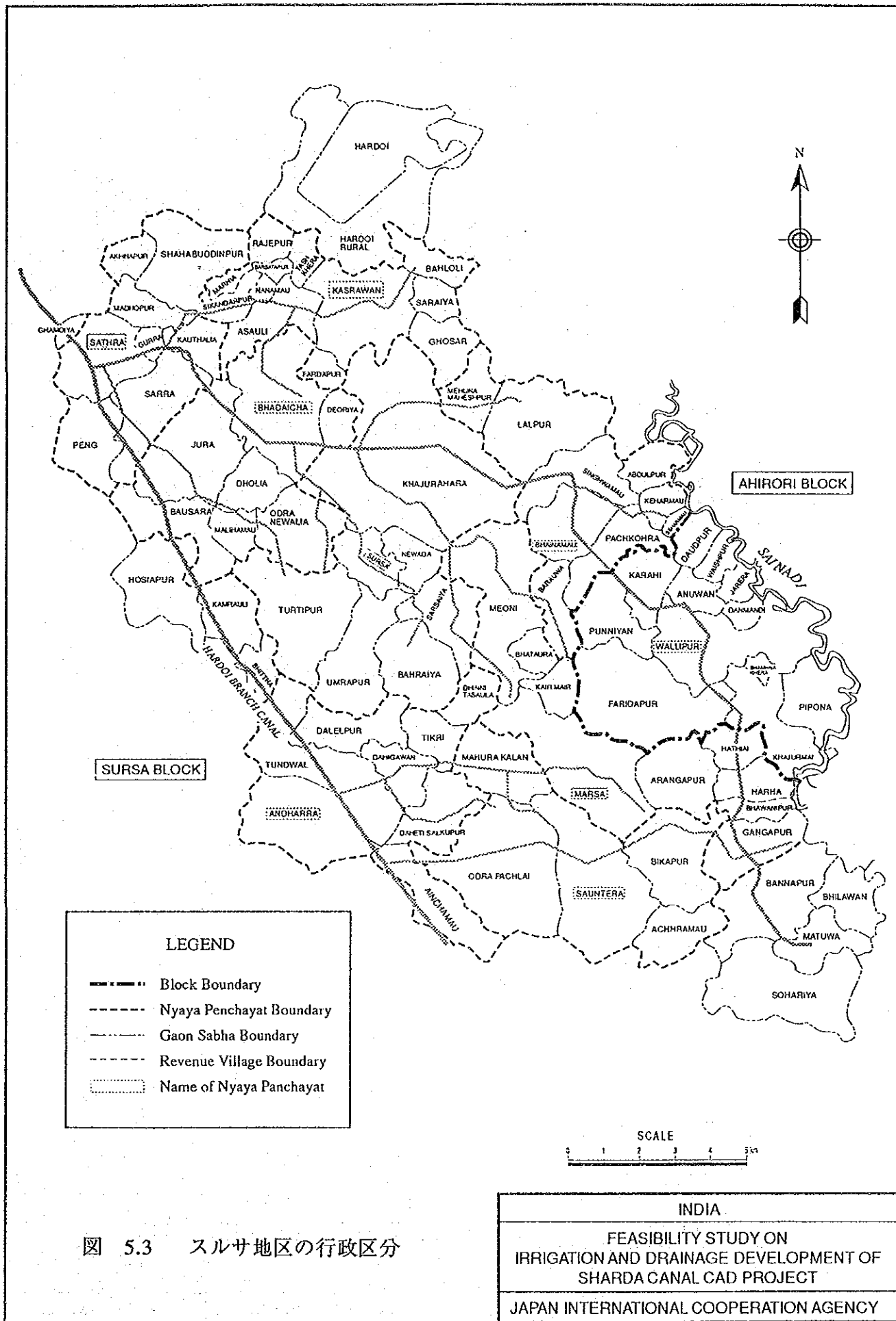


図 5.3 スルサ地区の行政区分

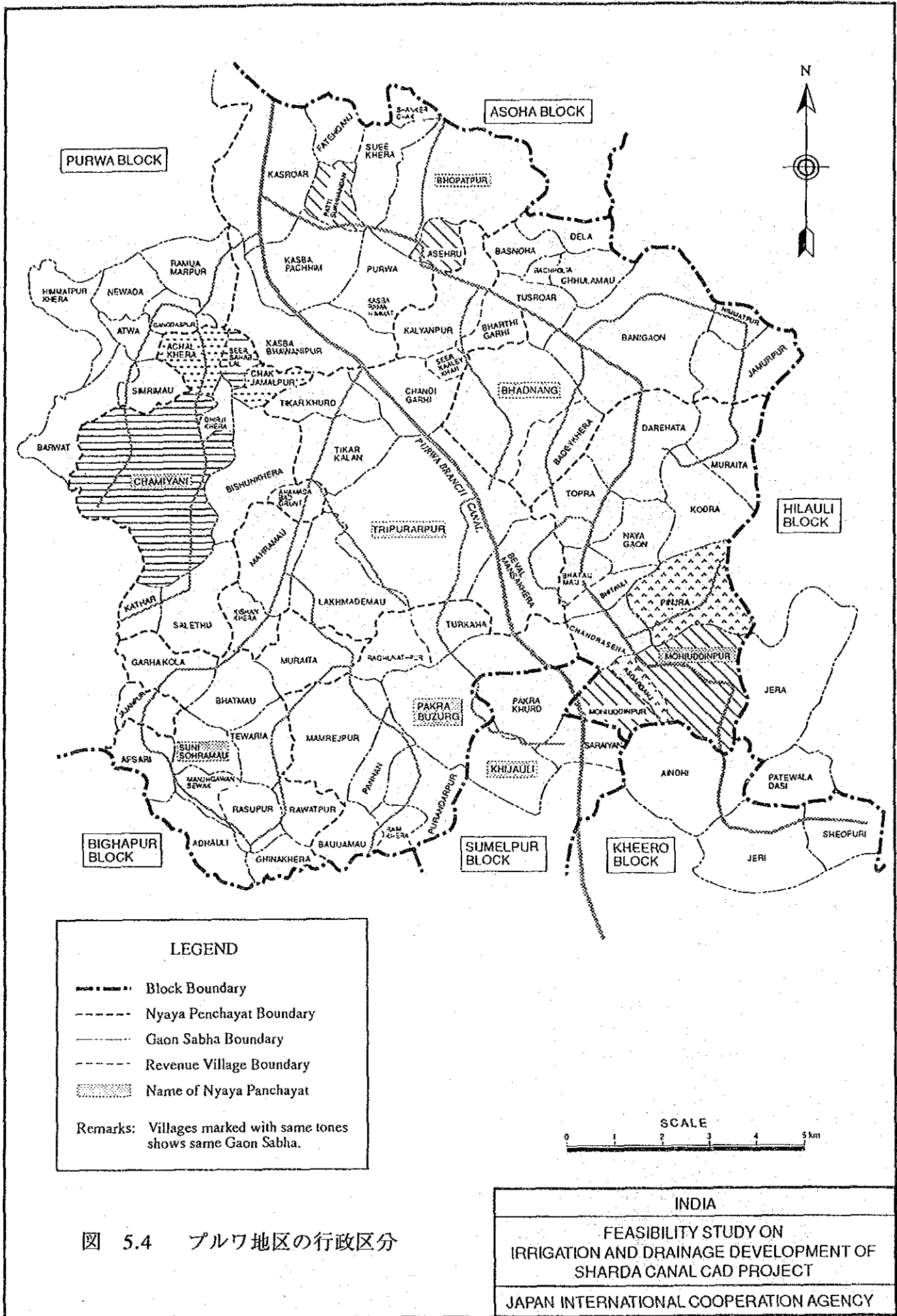


図 5.4 プルワ地区の行政区分

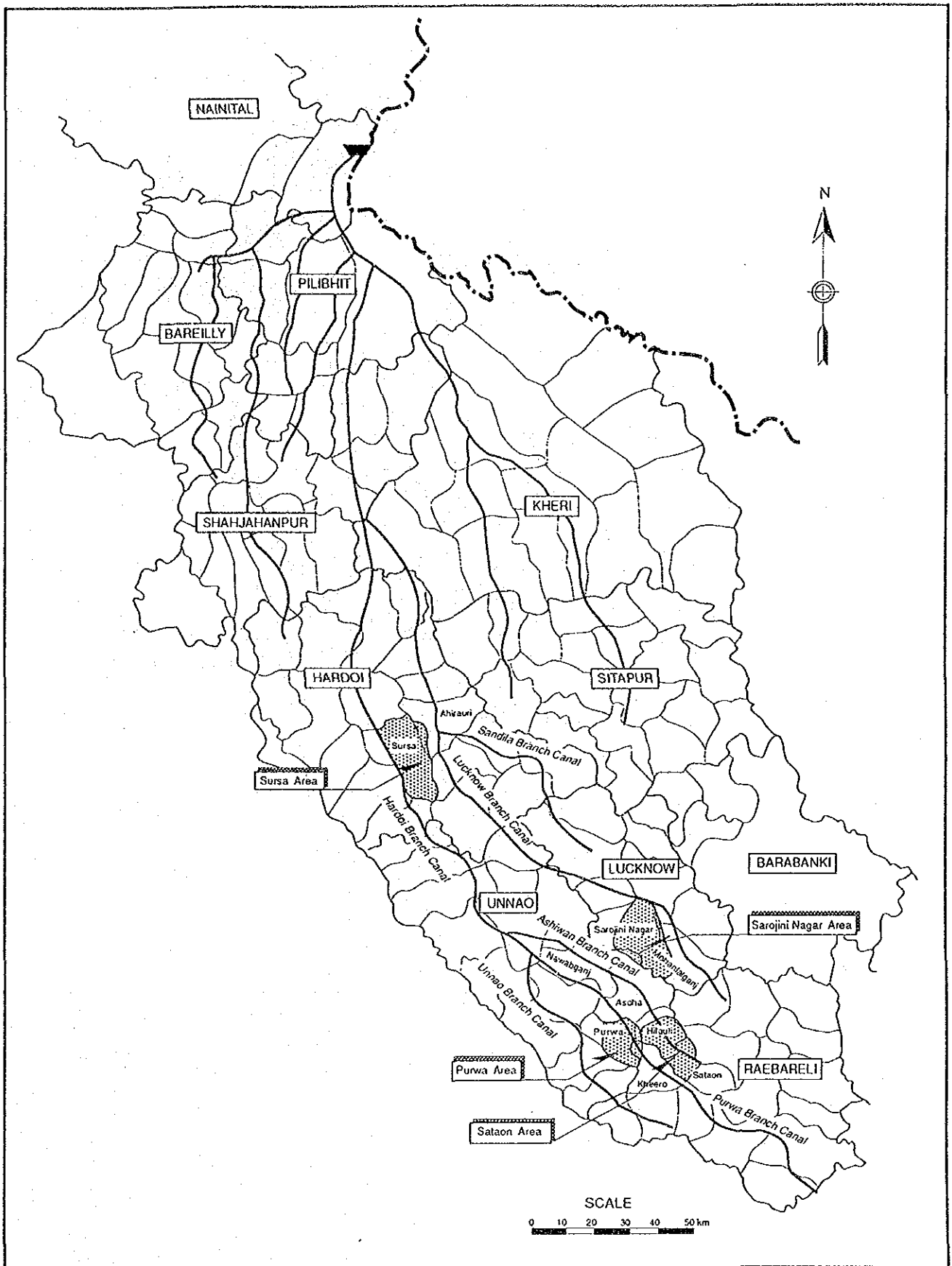


図 5.5 代表地区の主要灌漑水路系統図

|  |
|--|
| INDIA  |
| FEASIBILITY STUDY ON<br>IRRIGATION AND DRAINAGE DEVELOPMENT OF<br>SHARDA CANAL CAD PROJECT |
| JAPAN INTERNATIONAL COOPERATION AGENCY   |

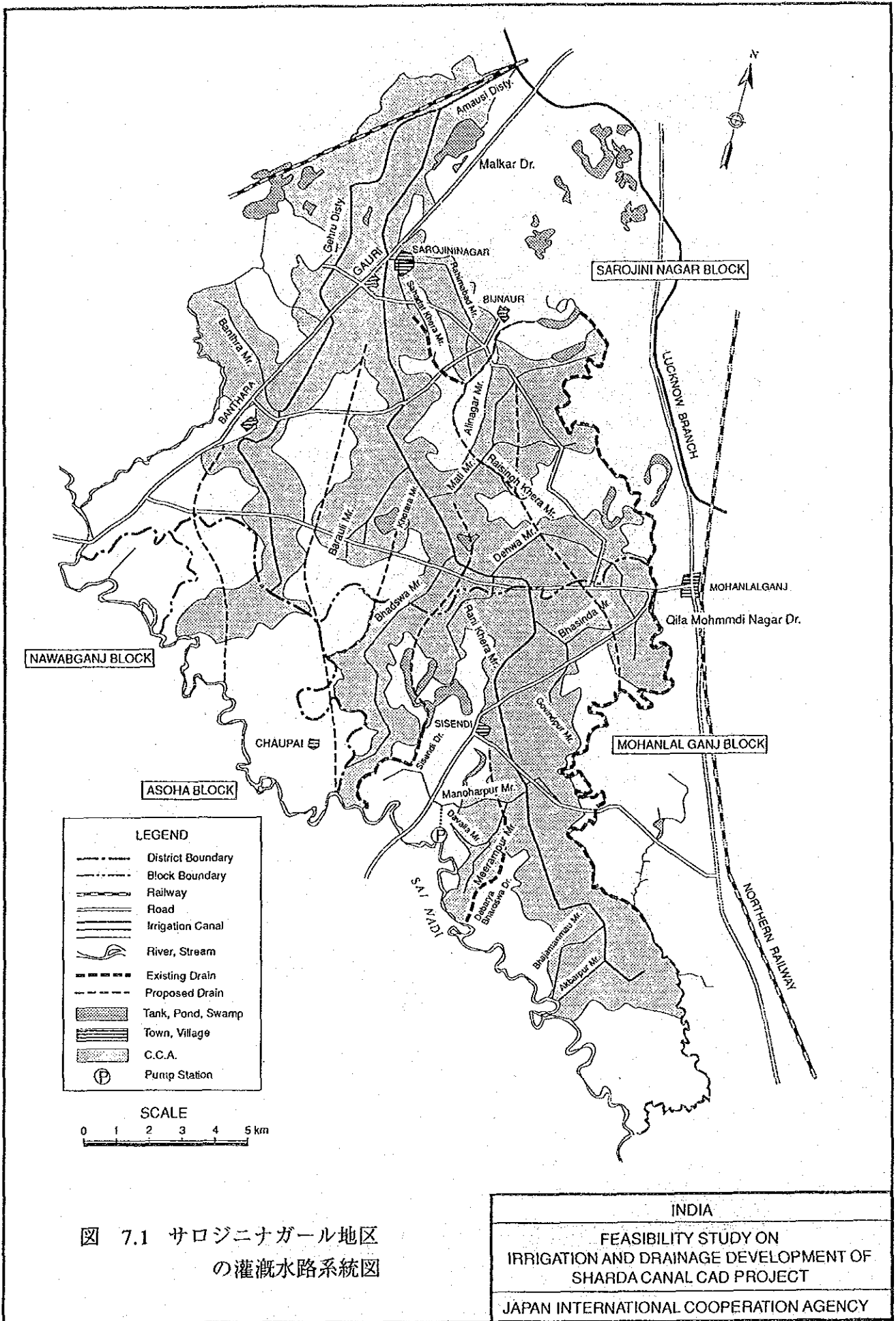


図 7.1 サロジニナガル地区の灌漑水路系統図

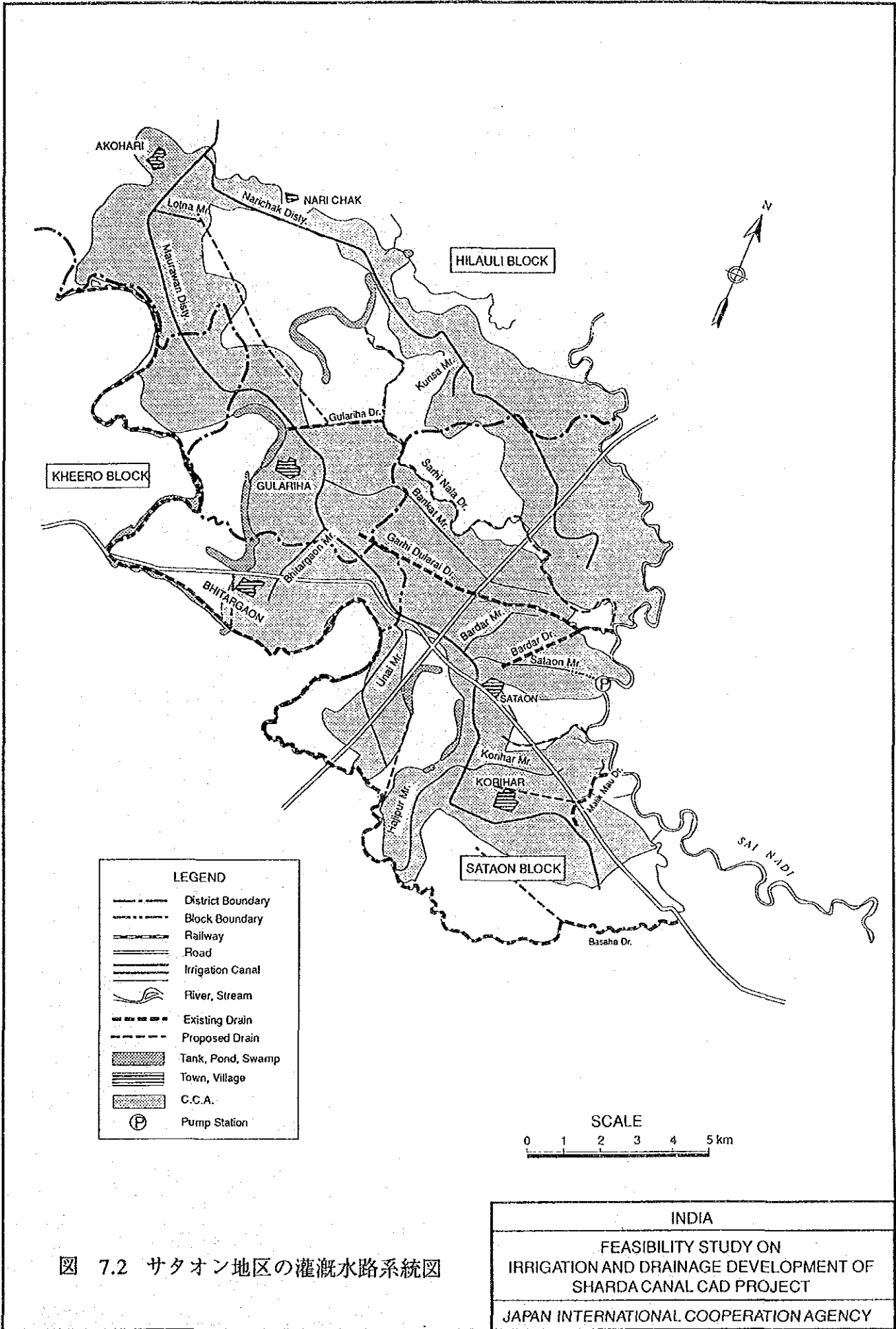


図 7.2 サタオン地区の灌漑水路系統図

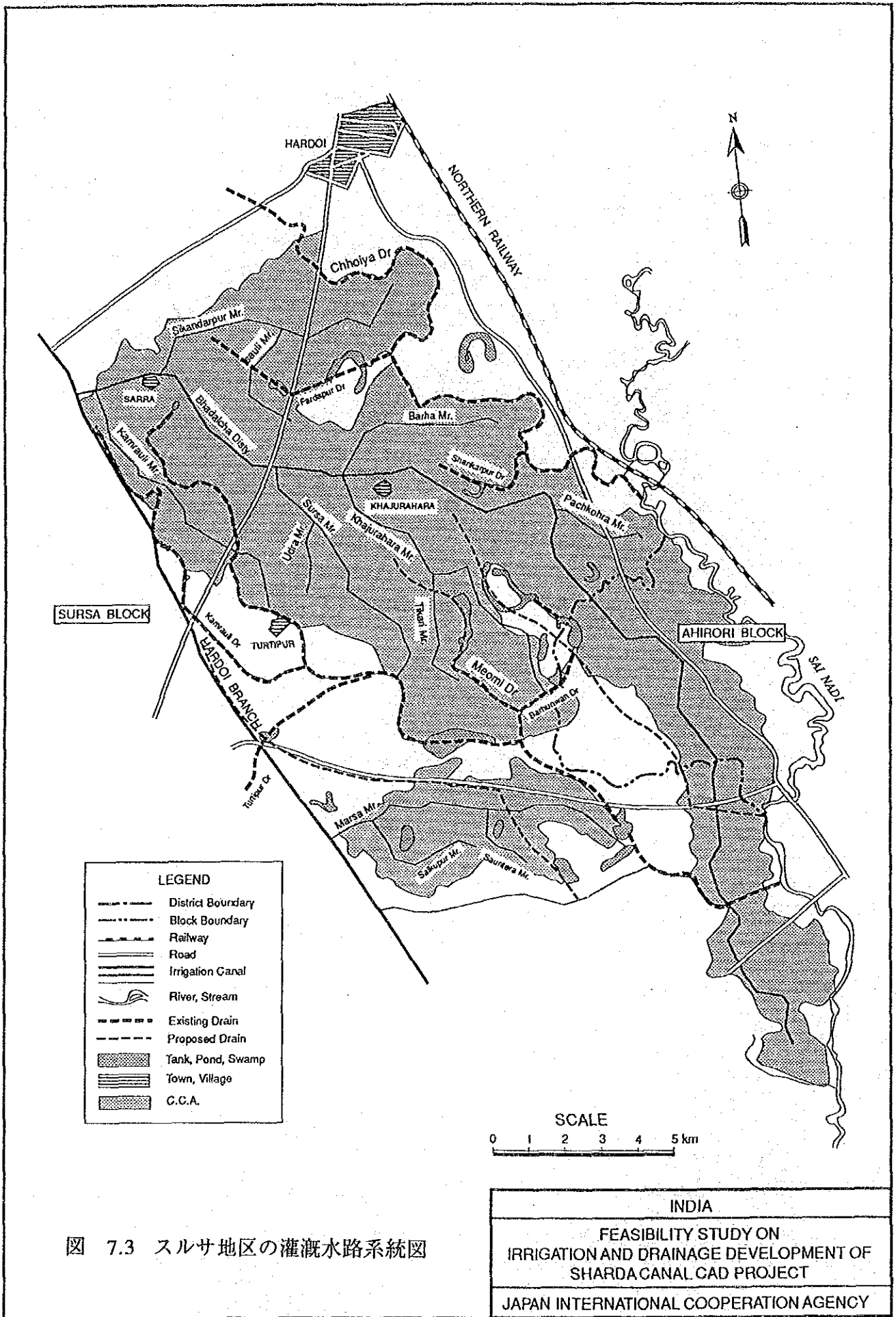


図 7.3 スルサ地区の灌漑水路系統図



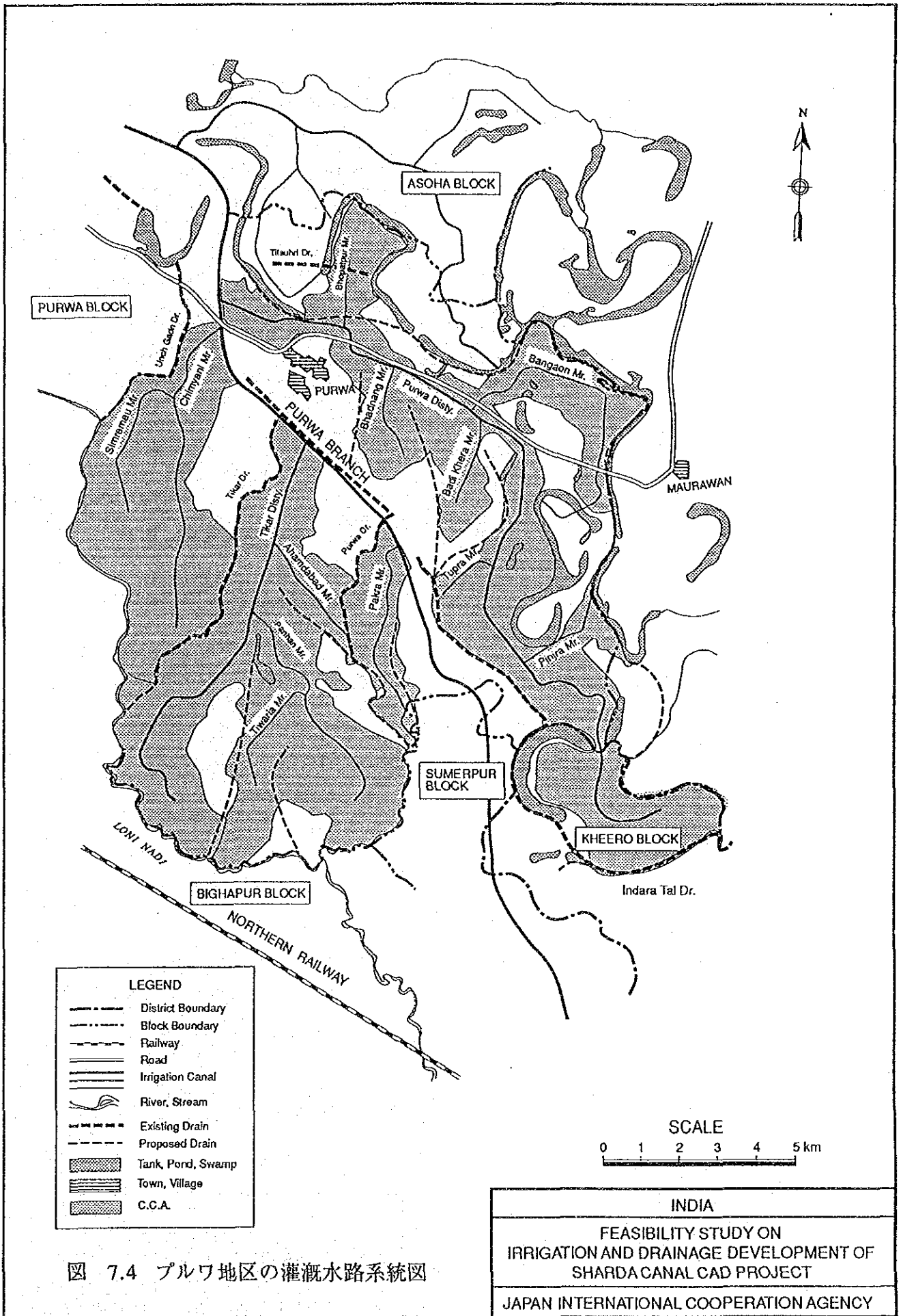
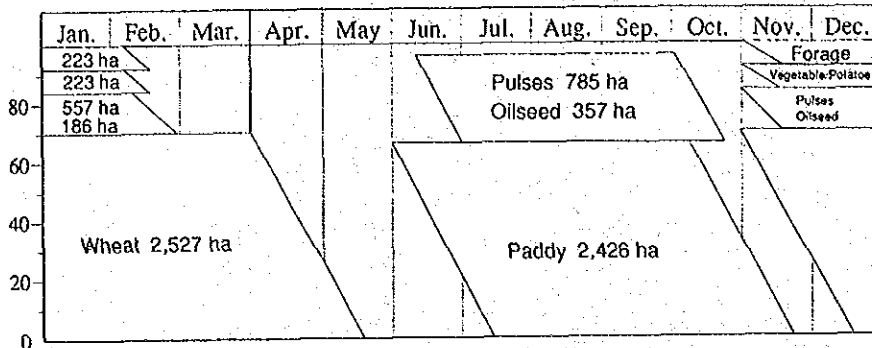


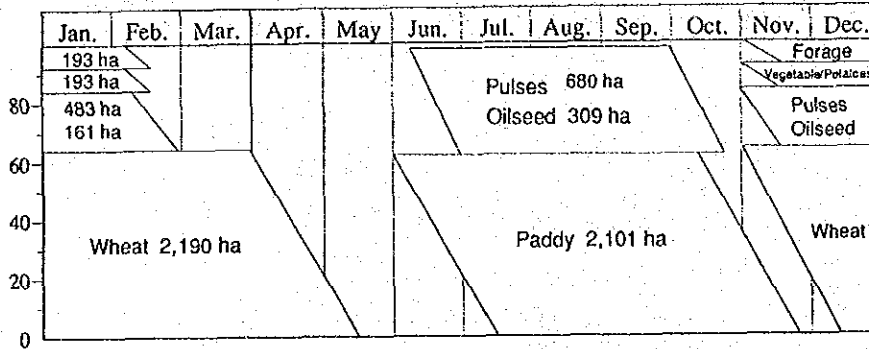
図 7.4 プルワ地区の灌漑水路系統図

PROPOSED CROPPING PATTERN IN CANAL IRRIGATION AREA

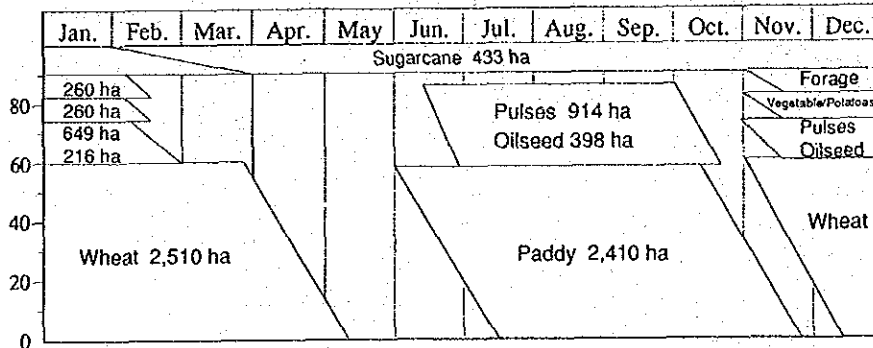
SAROJINI NAGAR (Kharif: 3,567 ha Rabi: 3,716 ha)



SATAON (Kharif: 3,090 ha Rabi: 3,219 ha)



SURSA (Kharif: 4,155 ha Rabi: 4,328 ha)



PURWA (Kharif: 2,941 ha Rabi: 3,063 ha)

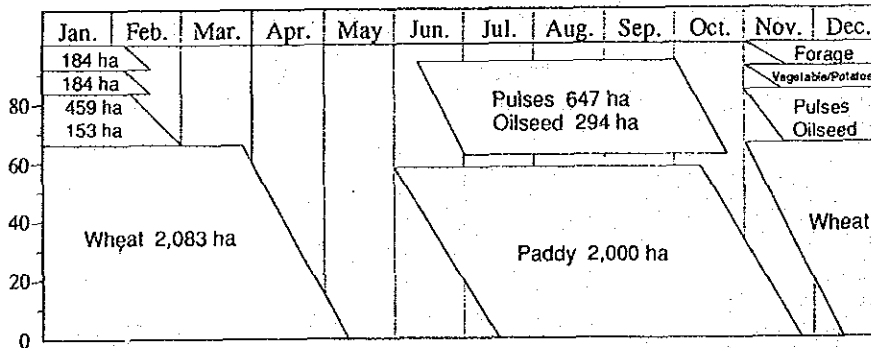
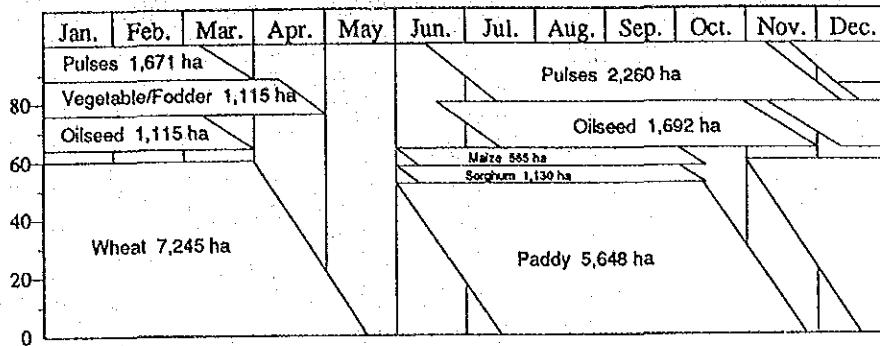


图 7.5 計画作付体系 (1/2)

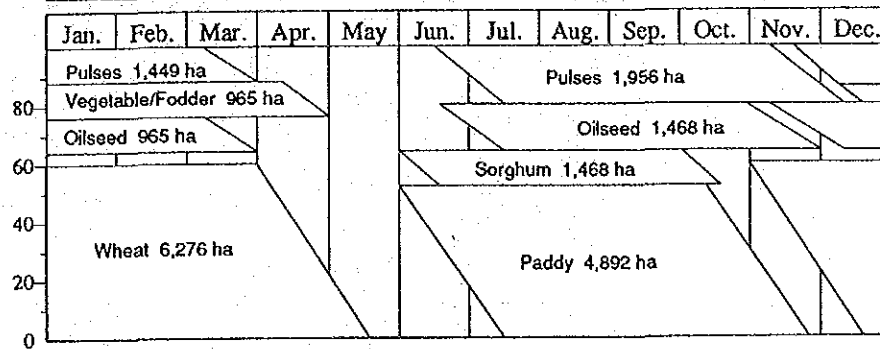
INDIA  
 FEASIBILITY STUDY ON  
 IRRIGATION AND DRAINAGE DEVELOPMENT OF  
 SHARDA CANAL CAD PROJECT  
 JAPAN INTERNATIONAL COOPERATION AGENCY

PROPOSED CROPPING PATTERN IN NON-CANAL IRRIGATION AREA

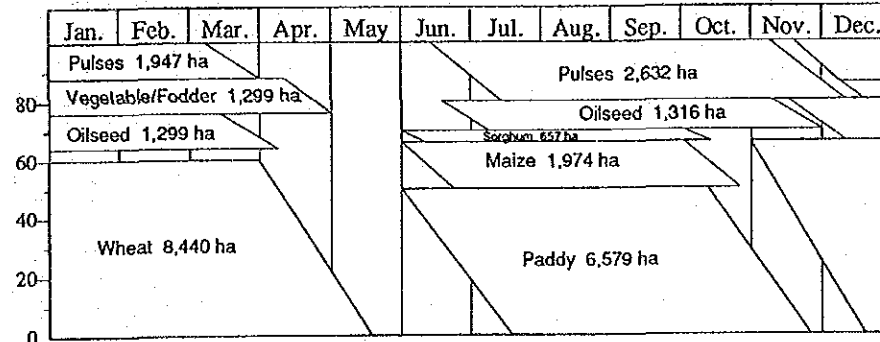
**SAROJINI NAGAR** (Kharif: 11,295 ha Rabi: 11,146 ha)



**SATAON** (Kharif: 9,784 ha Rabi: 9,655 ha)



**SURSA** (Kharif: 13,158 ha Rabi: 12,985 ha)



**PURWA** (Kharif: 9,311 ha Rabi: 9,189 ha)

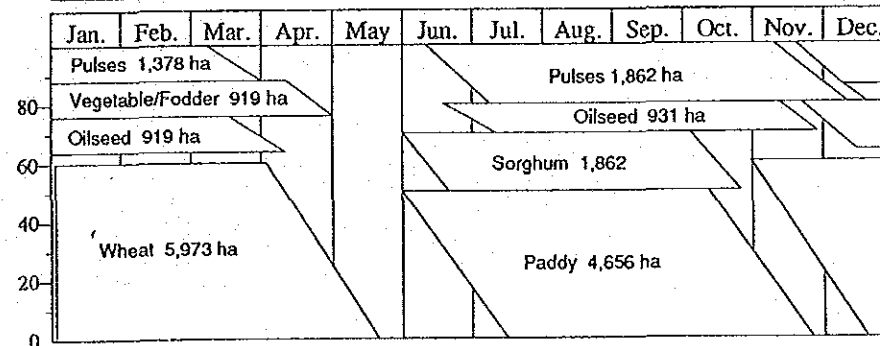


図 7.5 計画作付体系 (2/2)

INDIA  
 FEASIBILITY STUDY ON  
 IRRIGATION AND DRAINAGE DEVELOPMENT OF  
 SHARDA CANAL CAD PROJECT  
 JAPAN INTERNATIONAL COOPERATION AGENCY

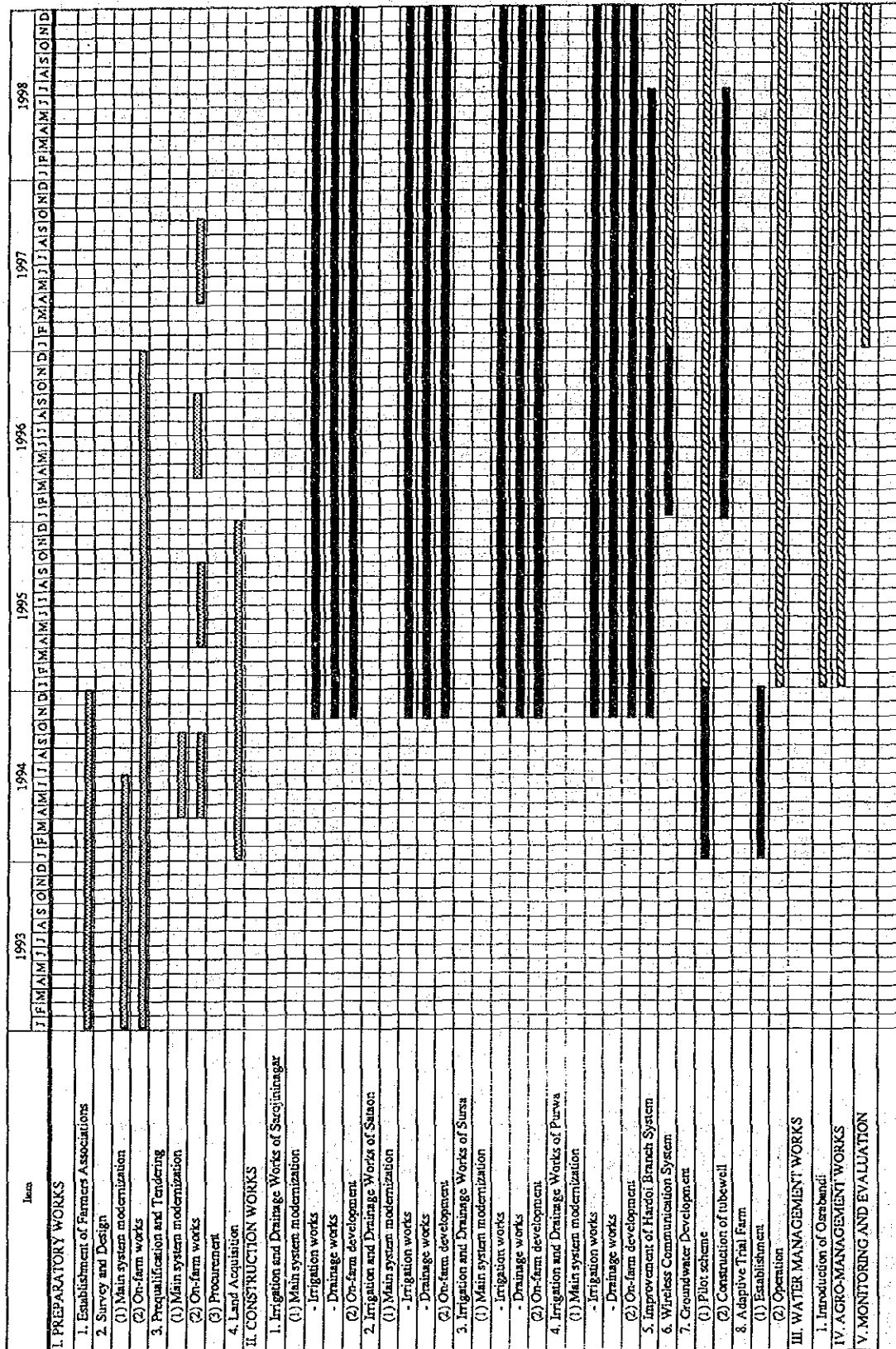


図 8.1 事業実施計画

INDIA

FEASIBILITY STUDY ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF  
SHARDA CANAL CAD PROJECT

JAPAN INTERNATIONAL COOPERATION AGENCY

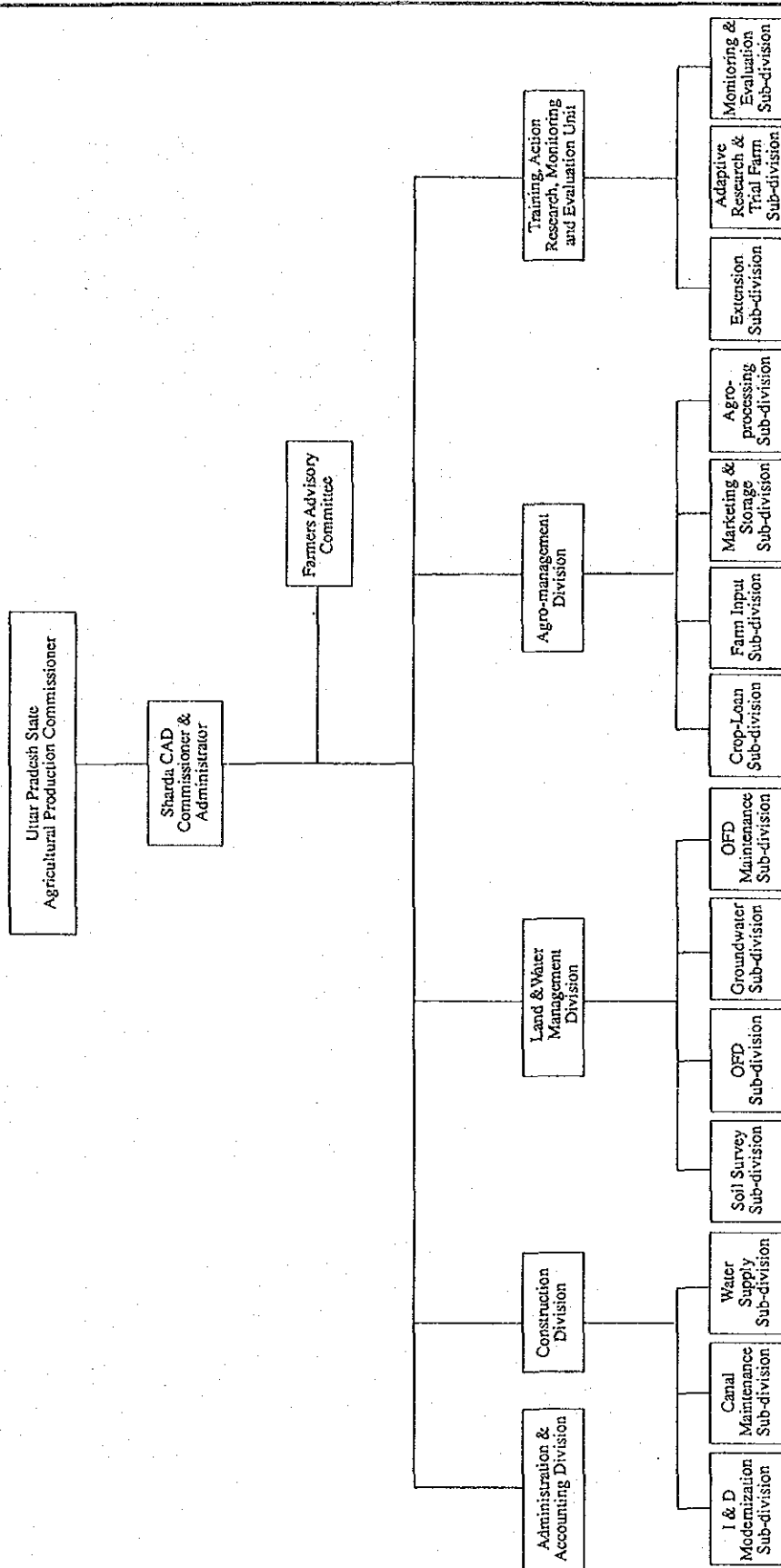


図 8.2 事業実施体制

INDIA  
 FEASIBILITY STUDY ON  
 IRRIGATION AND DRAINAGE DEVELOPMENT OF  
 SHARDA CANAL CAD PROJECT  
 JAPAN INTERNATIONAL COOPERATION AGENCY

図 10.1 全体事業実施計画

| Item  | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| <b>I. PHASE-I</b>   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (1) 4 Representative Areas  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (a) Survey and design   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (b) Modernization of main system                                  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (c) On-farm development   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (d) Establishment of farmers assoc. and introduction of Osrabandi |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (e) Action research   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| <b>II. PHASE-II</b>   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (1) Comprehensive Study for Sharda Command Area                   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (2) Improvement of Hardoi Branch Canal                            |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (3) Construction Works  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (a) Survey and design   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (b) Construction works  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| - Modernization of Hardoi Branch system                           |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| - Renovation of on-farm works for Hardoi Branch command           |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| - Groundwater development   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (4) Establishment of Farmers Assoc. and Introduction of Osrabandi |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| <b>III. PHASE-III</b>   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (1) Construction Works  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (a) Survey and design   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (b) Construction works  |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| - Modernization of remaining Sharda system                        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| - Renovation of on-farm works for remaining Sharda command        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| - Groundwater development   |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (2) Establishment of Farmers Assoc. and Introduction of Osrabandi |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

Note : \* : to be adjusted according to the progress  
 \*\* : to be continued

INDIA  
 FEASIBILITY STUDY ON  
 IRRIGATION AND DRAINAGE DEVELOPMENT OF  
 SHARDA CANAL CAD PROJECT  
 JAPAN INTERNATIONAL COOPERATION AGENCY

付属資料

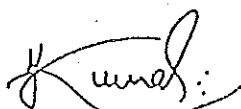




SCOPE OF WORK  
FOR THE  
FEASIBILITY STUDY  
ON THE  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT  
IN INDIA

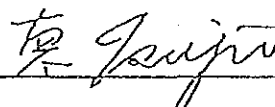
AGREED UPON BETWEEN  
THE MINISTRY OF WATER RESOURCES  
THE GOVERNMENT OF INDIA,  
DEPARTMENT OF AREA DEVELOPMENT  
THE STATE GOVERNMENT OF UTTAR PRADESH  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

DELHI, APRIL 19, 1990



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MR. NAVIN KUMAR  
DIRECTOR  
MINISTRY OF WATER RESOURCES



---

MR. NORIKAZU TSUJII  
LEADER OF THE  
PRELIMINARY STUDY TEAM  
JAPAN INTERNATIONAL COOPERATION  
AGENCY



19.4.90

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MR. VED PARKASH SHARMA  
JOINT SECRETARY  
ON BEHALF OF SECRETARY  
DEPARTMENT OF AREA DEVELOPMENT  
STATE GOVERNMENT OF UTTAR PRADESH

## I . INTRODUCTION

In response to the request of the Government of India (hereinafter referred to as "GOI"), the Government of Japan (hereinafter referred to as "GOJ") has decided to implement the Feasibility Study on the Irrigation and Drainage Development of Sharda Canal CAD Project (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of GOJ, will undertake the Study in close cooperation with the authorities concerned of GOI and the State Government of Uttar Pradesh (hereinafter referred to as "SGOUP").

On the part of GOI and SGOUP, the Ministry of Water Resources (hereinafter referred to as "MWR"), and the Department of Area Development (hereinafter referred to as "DAD") shall act, respectively, as a counterpart agency to the Japanese study team and also as a coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.

The present document sets forth the Scope of Work with regard to the Study.

## II . OBJECTIVES OF THE STUDY

The objective of the Study is to formulate an optimum agricultural development plan for the selected areas in the command area of Sharda Canal CAD Project.

## III . STUDY AREA

The Study area covers command area of Hardoi Branch Canal within Sharda Canal CAD Project.

## IV . SCOPE OF THE STUDY

The Study consists of the following two stages.

### Stage I

- (1) Study on current status of Sharda Canal System and Sharda Canal CAD Project with emphasis on command area of Hardoi Branch Canal.
- (2) Screening and selection of representative CAD areas to be studied in detail in Stage II .

### Stage II

- (1) Conduct of supplementary study in the selected CAD areas.
- (2) Formulation of an agricultural development plan and preparation of project implementation programme for the selected CAD areas.

### 1. Stage I

- (1) Collection and review of relevant existing data/information and conduct of field survey on such items including those

listed below as deemed necessary for the selection of representative CAD areas to be studied in detail in Stage II.

- a. Topography
  - b. Meteorology and hydrogeography
  - c. Geology and hydrogeology
  - d. Soil
  - e. Land use
  - f. Agriculture
  - g. Agro-economy and rural economy
  - h. Agricultural supporting services
  - i. Farmers' organization
  - j. Irrigation including conjunctive use of surface and ground water
  - k. Drainage
  - l. Canal operation/maintenance and water management system
  - m. Construction materials and cost
  - n. Others
- (2) Confirmation of existing irrigation and drainage system (including operation/maintenance and water management system) in the command area of Hardoi Branch Canal.
  - (3) Screening and selection of representative CAD areas to be studied in detail in Stage II.

## 2. Stage II

- (1) Conduct of supplementary data/information collection and field survey on the selected CAD areas.
- (2) Formulation of an agricultural development plan for the

selected CAD areas, consisting of:

- a. Land use, cropping pattern and farming system development plan;
- b. Irrigation and drainage development/improvement plan;
- c. Operation and maintenance improvement plan;
- d. Water management system and farmers' organization (including agricultural supporting services) improvement plan.

(3) Preparation of project implementation programme for the selected CAD areas.

(4) Project evaluation.

## V. REPORTS

JICA shall prepare and submit the following reports in English to GOI/SGOUP.

### 1. Inception report

Thirty (30) copies at the commencement of the Stage I Study.

### 2. Progress Report (I)

Thirty (30) copies at the end of the field work of the Stage I Study.

### 3. Interim Report

Thirty (30) copies at the end of the home office work of the Stage I Study.

### 4. Progress Report (II)

Thirty (30) copies at the end of the field work of the Stage II Study.

5. Draft Final Report

Thirty (30) copies within one (1) month following the end of the home office work of the Stage II Study.

GOI/SGOUP shall provide JICA with its comments within one (1) month after the receipt of the Draft Final Report.

6. Final Report

Fifty (50) copies within two (2) months after the receipt of the GOI/SGOUP's comments on the Draft Final Report.

VI. STUDY SCHEDULE

The Study will be executed in accordance with the attached tentative work schedule.

VII. UNDERTAKING OF GOI/SGOUP

1. To facilitate smooth conduct of the Study, GOI/SGOUP shall take necessary measures:

- (1) to secure the safety of the Japanese study team;
- (2) to permit the members of the Japanese study team to enter, leave and sojourn in India for the duration of their assignment therein, and exempt them from alien registration requirements during the period of the Study and consular fees;
- (3) to exempt the members of the Japanese study team from taxes, duties, fees and other charges on equipment, machinery and other materials brought into India for the conduct of the Study;
- (4) to exempt the members of the Japanese study team from income tax

and charges of any kind imposed on or in connection with any emolument or allowances paid to the members of the Japanese study team for their services in connection with the implementation of the Study;

(5) to provide necessary facilities to the Japanese study team for remittances as well as utilization of the funds introduced into India from Japan in connection with the implementation of the Study;

(6) to secure permission for entry into private properties or restricted areas for the conduct of the study;

(7) to secure permission to take all data and documents (including photographs) related to the Study out of India to Japan by the Study team;

(8) to provide medical services as needed and its expenses will be chargeable on members of the Japanese study team.

2. GOI/SGOUP shall bear claims, if any arises, against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or wilful misconduct on the part of the members of the Japanese study team.

3. GOI/SGOUP shall, at its own expense, provide the Japanese study team with the following in cooperation with other agencies concerned:

(1) available data and information including topographic maps related to the Study;

- (2) additional survey related to the Study, if any;
- (3) counterpart personnel to participate in the various activities of the Study;
- (4) necessary equipment in Lucknow and suitable office space at the Project sites;
- (5) appropriate number of vehicles with drivers;
- (6) credentials or identification cards to the members of the Japanese study team.

#### VIII. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. to dispatch, at its own expense, study team to India;
2. to pursue technology transfer to the Indian counterpart personnel in the course of the Study.

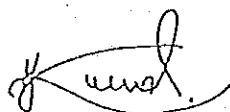
#### IX. CONSULTATION

JICA and MWR/DAD shall consult with each other in respect of any matter that may arise from or in connection with the Study.



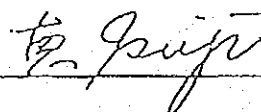


MINUTES OF MEETING  
ON  
DISCUSSIONS OF SCOPE OF WORK  
FOR THE  
FEASIBILITY STUDY  
ON THE  
IRRIGATION AND DRAINAGE DEVELOPMENT  
OF  
SHARDA CANAL CAD PROJECT  
IN INDIA  
DELHI.  
APRIL 19, 1990



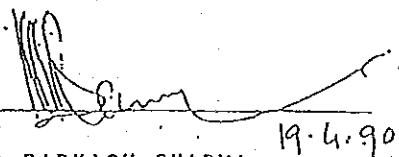
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MR. NAVIN KUMAR  
DIRECTOR  
MINISTRY OF WATER RESOURCES



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MR. NORIKAZU TSUJII  
LEADER OF THE  
PRELIMINARY STUDY TEAM  
JAPAN INTERNATIONAL COOPERATION  
AGENCY



19.4.90

---

MR. VED PARKASH SHARMA  
JOINT SECRETARY  
ON BEHALF OF SECRETARY  
DEPARTMENT OF AREA DEVELOPMENT  
STATE GOVERNMENT OF UTTAR PRADESH

The Preliminary Study Team, headed by Mr. Norikazu Tsujii, for the Feasibility Study on the Irrigation and Drainage Development of Sharda Canal CAD Project (hereinafter referred to as "the Study") made a visit to India from 8th to 20th April, 1990, to discuss the Scope of Work for the Study with authorities concerned of the Government of India.

In connection with the above, a series of discussions was held between the Preliminary Study Team and the authorities concerned of the Government of India/the State Government of Uttar Pradesh (list of participants attached as ANNEX), and both sides came to an agreement and signed the Scope of Work on April 19th, 1990.

This Minutes of Meeting complements the Scope of Work for the smooth conduct of the Study, and salient features are as follows.

1. Both sides confirmed, as to the Sharda Canal CAD Project, the importance of such problems as existence of salinity/alkalinity affected areas and of water-logging areas, and also the necessity of promoting on-farm-development and canal rehabilitation.
2. In view of the above, both sides agreed that the feasibility study report may be prepared with special attention to the solution of drainage problems, control of salinity/alkalinity, modernization of irrigation facilities, improvement of water management system and utilization of underground water, among other things, including execution of on-farm-development works.

3. Both sides agreed that the number of areas to be selected for detailed study is expected to be 3 to 4 blocks/units, each having approximately 8,000 to 12,000 ha of land area, depending on the results of Stage I Study, within Phase I and Phase II areas of Sharda Canal CAD Project.

Indian side requested that, in the course of the screening and selection work of such areas in Stage I Study, emphasis shall be placed upon the command area covered by Hardoi Branch Canal, having culturable command area of approximately 757,000 ha.

After discussions, both sides agreed to confine the Study area to the command area of Hardoi Branch Canal within Sharda Canal CAD Project.

4. Both sides agreed that "additional survey" mentioned in VII. 3. (2) of the Scope of Work relates to soil testing and topographic surveys.
5. Both sides agreed that the Ministry of Water Resources at the central government level, and also the Department of Area Development at the UP State Government level, shall act, at each level, as a counterpart agency to the Japanese Study Team and also as a coordinating body in relation with other governmental and non-governmental organizations related with the Study.
6. Indian side requested the Japanese side to give technical training in Japan to Indian personnel involved in the Study.  
Japanese side stated that it would convey the request to the Japanese Government.

## ANNEX

### LIST OF ATTENDANTS

#### 1. MINISTRY OF WATER RESOURCES

Mr. Navin KUMAR            Director

Mr. Inder MOHAN           Deputy Commissior (CAD)

#### 2. MINISTRY OF FINANCE

Mr. S. JOSHI              Deputy Secretary, Department of Economic Affairs

#### 3. STATE GOVERNMENT OF UTTAR PRADESH

Dr. I.P. ARON              Secretary, Department of Area Development

Mr. Vinod MALHOTRA       Administrator, Sharda-Sahayak CAD Authority,  
Department of Area Development

Mr. V.P. SHARMA          Joint Secretary, Department of Area Development

Mr. Shahabuddin AHMED   Chief Engineer, Sharda Canals, Department of  
Irrigation

Mr. Ranbir AHUJA          Special Secretary, Department of Irrigation

Mr. Krishna CHADRA       Superintending Engineer, VI Circle, Department of  
Irrigation

Mr. M.R. SIDDIQI          Chief Engineer, Department of Area Development

Mr. O.K. BHATNAGAR       Additional Director, Department of Agriculture

Dr. G.N. SINGH             Deputy Director, Agriculture, Sharda-Sahayak  
Command Area Development Authority

#### 4. EMBASSY OF JAPAN

Mr. Masamichi SAIGO      First Secretary

#### 5. JICA INDIA OFFICE

Mr. Toshio HIDA           Representative

6. PRELIMINARY STUDY TEAM

Mr. Norikazu TSUJII Leader

Mr. Yoshikatsu SEKO Irrigation and Drainage Expert

Mr. Katsushi HARA Agriculture Expert

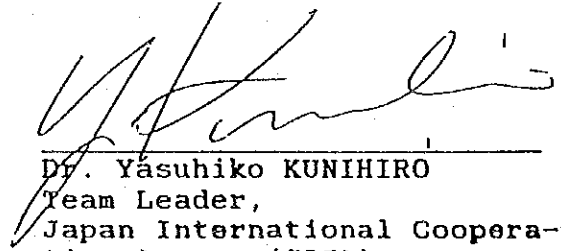
Mr. Atsushi HANATANI Coordinator

MINUTES OF MEETING  
ON  
INCEPTION REPORT  
FOR  
FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT



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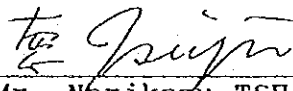
Mr. Harsh V. SANWAL  
Secretary,  
Department of Area development,  
State Government of Uttar Pradesh



---

Dr. Yasuhiko KUNIHRO  
Team Leader,  
Japan International Cooperation Agency (JICA)

*Vivek Malhotra*



---

Mr. Norikazu TSUJII  
Chairman,  
JICA Advisory Committee

Lucknow, Uttar Pradesh  
September 11, 1990

MINUTES OF MEETING  
ON  
INCEPTION REPORT  
FOR  
FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT

1. DATE : September 11, 1990
2. PLACE: Conference Room of Department of Housing and Urban Development
3. PARTICIPANTS :

Uttar Pradesh State Government Authorities Concerned

Department of Area Development  
Department of Irrigation  
Department of Agriculture  
Sharda-Sahayak CAD Authority

JICA Advisory Committee

JICA Study Team

Name of all the participants as per attached list

4. MINUTES OF DISCUSSION

The JICA Study Team headed by Dr. Yasuhiko Kunihiro met with the Secretary of the Department of Area Development (DAD) of the State Government of Uttar Pradesh (SGOUP), Mr. Harsh Sanwal on September 10, 1990 in his office, and submitted the Inception Report of the captioned Study. The Team Leader outlined the general features of the Study and requested cooperation of the SGOUP to smoothly and effectively execute the Study.

A separate meeting with the Commissioner and Administrator of the Sharda-Sahayak Command Area Development (CAD) Authority, Mr. Vinod Malhotra, was held at 3:00 pm on September 10, 1990. The Team Leader presented the plan of operation of the Study in more detail and requested cooperation of SGOUP in the matters of assigning counterpart personnel for various consultation and for providing relevant information in various aspects of the Study.

The meeting on the Inception Report on September 11, 1990 was presided by the Secretary of DAD. He presented the general agenda to the participants from SGOUP agencies concerned and turned over the presentation of the report to the Leader of JICA Study Team.



After presentation of the report, the discussion was made to confirm the basic approach to the Study and the plan of operation on the basis of the result of the preceding meeting.

Through the discussions, the plan of operation was basically accepted by the SGOUP authorities concerned. The JICA Study Team would proceed with the Feasibility Study in line with the agreed plan of operation.

The summary of discussion of the meeting is as follows:

- (1) Counterpart personnel are assigned to each expert of the Study Team during the period of their assignments in India. The list of their names was issued by the Commissioner of Sharda-Sahayak CAD Authority, as per request made by the Team Leader in the previous meeting on September 10.

| Name                | Designation                       | Specialty   |
|---------------------|-----------------------------------|---|
| Sri O.P. Chaturvedi | Additional Director               | Co-Team Leader/<br>Agriculture                                    |
| Sri M.C. Upreti     | Co-relator and<br>Project officer | Soil and land use/<br>Project economy                             |
| Sri S.P. Srivastava | Deputy Director                   | Agronomy  |
| Sri Mauglani        | Additional Regist-<br>rator       | Agro-economy/<br>Institution                                      |
| Sri J.P.Garg        | Deputy Director                   | Structural<br>planning & design                                   |
| Sri P.N.Misra       | Executive Engineer<br>Hardoi      | Irrigation & water<br>management                                  |
| Dr. Dhaneshwar Rai  | Senior Hydrologist                | Drainage planning<br>Meteo-hydrology<br>Geology/Geo-<br>hydrology |

- (2) DAD provides a required number of off-road vehicles with drivers from the field offices of DAD to the Study Team and counterpart personnel to execute the field investigation. The Study Team will give two days notice of such requirement to DAD on the basis of weekly schedules to be submitted.
- (3) A steering committee consisting of the representatives of the agencies concerned of the Government of India and SGOUP will be held once a month to coordinate the activities of the Study.

LIST OF ATTENDANTS

A. State Government of Uttar Pradesh

1. Department of Area Development

- |                        |                 |
|------------------------|-----------------|
| 1. Mr. Harsh V. Sanwal | Secretary       |
| 2. Mr. V. P. Sharma    | Joint Secretary |

2. Department of Irrigation

- |                         |                             |
|-------------------------|-----------------------------|
| 1. Mr. Y.K. Mathur      | Director Groundwater        |
| 2. Mr. K. Chandra       | Superintending Engineer     |
| 3. Mr. C. S. Agrawal    | Sr. Hydrologist Groundwater |
| 4. Mr. Y. N. Srivastava | Staff Officer               |

3. Department of Agriculture

- |                      |                       |
|----------------------|-----------------------|
| 1. Mr. V. W. Ambekar | Director, Agriculture |
| 2. Mr. P. Narain     | Director, Statistic   |

4. Sharda-Sahayak CAD Authority

- |                         |                              |
|-------------------------|------------------------------|
| 1. Mr. V. Malhotra      | Commissioner & Administrator |
| 2. Mr. Tulsi Gaur       | Additional Administrator     |
| 3. Mr. O. P. Chaturvedi | Additional Director          |
| 4. Mr. B. N. Dixit      | Deputy Administrator         |
| 5. Mr. M. C. Uprety     | Co-relator                   |
| 6. Mr. S. P. Srivastava | Deputy Director              |
| 7. Mr. J. P. Garg       | Deputy Director Extension    |

B. JICA Advisory Team

- |                   |                                |
|-------------------|--------------------------------|
| 1. Mr. N. Tsujii  | Chairman of Advisory Committee |
| 2. Mr. Y. Okazaki | JICA, Tokyo                    |

C. JICA Study Team

- |                     |  |
|---------------------|--|
| 1. Dr. Y. Kunihiro  | Team Leader                                  |
| 2. Mr. H. Kuronuma  | Co-team Leader/Irrigation & Water Management |
| 3. Mr. M. Kobayashi | Drainage Planning                            |
| 4. Mr. W. Suido     | Geology/Geo-hydrology                        |
| 5. Mr. K. Gotoh     | Soil & Land Use                              |
| 6. Mr. N. Sambe     | Meteo-Hydrology                              |
| 7. Mr. K. Kyoizumi  | Structural Planning & Design                 |
| 8. Dr. P. K. Rao    | Agro-economy and Institution                 |

MINUTES OF MEETING  
ON  
PROGRESS REPORT (I)  
FOR  
FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT  
IN INDIA  
DELHI.  
OCTOBER 30, 1990



---

Mr. J.R. AGGARWAL  
Chief Engineer(CAD)  
Ministry of Water Resources  
Government of INDIA



for Mr. Y. KUNIHIRO  
Team Leader,  
Japan International  
Cooperation Agency(JICA)

1. Date : October 29, 1990
2. Place : Office Room of the Chief Engineer of CAD, Ministry of Water Resources, New Delhi.
3. Participants : List of Participants attached
4. Chairman : Mr. J.R. Aggarwal, Chief Engineer (CAD), Ministry of Water Resources, Government of India.

#### 5. Minutes of Discussion

1. The minutes of the first meeting of the Steering Committee held at Lucknow on October 16, 1990 were discussed and confirmed.
2. The co-team leader of JICA presented the Progress Report - I Phase I (Oct, 1990) of Feasibility Study prepared by them during their stay at Lucknow and put up for discussions. The committee expressed appreciations for JICA Team for preparing this report in the limited time as available. During the discussions, some additional alternatives in the Chapter 1- INTRODUCTION as given below were decided.
  - (i) Page 1, paragraph 3, at the end of paragraph, following be added;  
"In addition, the programme also covers adaptive trials, demonstrations, farmers' training, farmers' participation, action research, and installation of wireless communication network."
  - (ii) Page 1, paragraph 4 (last), last 7 lines be replaced by the following;  
"The entire schedule of project works of Sharda Canal has been revised and it is now proposed to be completed, in so far as on-farm development works are concerned, by March 1993."
  - (iii) Page 2, paragraph 1, line 5, the words "per unit" be replaced by "unit optimal".
3. The preliminary selection process as presented for selecting 4 representative blocks (each 8,000 - 12,000 ha) based on agro-economic parameters was discussed in details. Cognizance was taken of the paragraph-2 of the Minutes of Meeting on discussions of scope of works for the Feasibility Study (dated April 19, 1990) where in stress was laid for specified attention to; the solution of drainage problems, control of salinity/alkalinity, -modernization of irrigation facilities - improvement of water management system and -utilization of ground water etc. It was considered

imperative to select the blocks in such a way that the above issues get due representation.

4. The constitution of the Steering Committee was formulated as given below:

Government of India

- |    |  |                    |
|----|--|--------------------|
| 1. | Mr. J.R. Aggarwal, Chief Engineer(CAD)....   | Chairman           |
| 2. | Mr. Harsh V. Sanwal, Secretary, Department of Land Development, State Government of UP ..... | C o - Chairman     |
| 3. | Mr. Navin Kumar, Director EA, GOI.....   | member             |
| 4. | Mr. V. Malhotra, Administrator & Commissioner, Sharda-Sahayak CAD Authority .....            | member's secretary |
| 5. | Mr. Ranbir Ahuja, Special Secretary, Irrigation Department, G.O.U.P .....                    | member             |
| 6. | Mr. Bhargava, Chief Engineer, Sharda Canal, Irrigation Department G.O.U.P .....              | member             |
| 7. | Mr. Y.K. Mathur, Director, Ground Water Department, G.O.U.P, .....                           | member             |
| 8. | Dr. G.N. Singh, Directorate of Agriculture, G.O.U.P., .....                                  | member             |

JICA STUDY TEAM

- |     |  |        |
|-----|--|--------|
| 9.  | Mr. H. Kuronuma, co-team leader, JICA team.. | member |
| 10. | Dr. P.K. Rao, team member.....               | member |

5. The co-team leader of JICA study team while discussing of the schedule of work intimated that JICA team would be arriving in India on Dec. 23th, 1990 and requested for organizing next meeting of Steering Committee on Dec 27th, 1990 in Delhi at 3 pm so as to finalize the four representative blocks. He (Mr. Kuronuma) promised to send 5 copies of draft interim report to the Chief Engineer (CAD), G.O.I. and 10 copies to Secretary, Department of Area Development, U.P. by 17 th Dec, 1990.

6. The meeting ended with thanks to the chair.

## LIST OF PARTICIPANTS

(2nd Meeting of Steering Committee  
held on 29-Oct-1990 in New Delhi)

---

1. Mr. J.R. Aggarwal CE. (CAD), MOWR, New Delhi
2. Mr. Vinod Malhotra Commissioner and Administrator, Sharda Sahayak CAD Authority, Lucknow, U.P.
3. Mr. J. Rajagopalan Deputy Secretary (CAD), MOWR, New Delhi
4. Mr. V.S. Dinkar Joint Commissioner (CAD) MOWR, New Delhi
5. Mr. Inder Mohan Deputy Commissioner (CAD) MOWR, New Delhi
6. Mr. H. Kuronuma Co-Team Leader JICA Study Team
7. Mr. M. Kobayashi JICA Study Team
8. Mr. N. Sambe JICA Study Team
9. Mr. K. Yamada JICA Study Team
10. Dr. P.K. Rao JICA Study Team
11. Mr. K. Gotoh JICA Study Team
12. Mr. K. Kyoizumi JICA Study Team
13. Mr. W. Suidoh JICA Study Team

MINUTES OF MEETING  
ON  
STEERING COMMITTEE  
FOR  
FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF BHARDA CANAL CAD PROJECT

Shri J.R. Aggarwal  
Chief Engineer(CAD)  
Govt. of India

Mr. Harsh V. SANWAL  
Secretary,  
Department of Area Development  
State Government of Uttar Pradesh

Mr. Hiroshi KURONUMA  
Co- team Leader,  
Japan International Cooperation  
Agency ( JICA)

Mr. V. Malhotra  
The Commissioner & Administrator  
Sarda Sahayak CAD Authority.

Lucknow, Uttar Pradesh  
October 17, 1990

MINUTES OF MEETING

ON

STEERING COMMITTEE

FOR

FEASIBILITY STUDY

ON

IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT

1. DATE : October 16, 1990
2. PLACE : Office Room of the Secretary of the Department of Area Development, Lucknow, Uttar Pradesh
3. PARTICIPANTS : Government of India  
Ministry of Water Resources  
Uttar Pradesh State Government authorities concerned  
Department of Area Development  
Department of Irrigation  
Department of Agriculture  
Sharda Sahayak CAD Authority  
Ground Water Organization  
JICA Study Team  
Name of all the participants as per attached list

4. MINUTES OF DISCUSSION

The Steering Committee for the Field works of Stage-I was co-chaired by Mr. Harsh V. Sanwal, the Secretary of the Department of Area Development, Uttar Pradesh State Government and Shri J.R. Aggarwal, Chief Engineer (CAD), Government of India. Upon presentation by the Co-Team Leader, the discussion was held, aiming at smooth execution of the field works and further proceeding of the Study.

Secretary Area Development made the following observation for a smooth conduct of meetings as well as decision making process. He emphasised the need for communication of self contained complete agenda to the members concerned at least one week prior to the date of meeting.

Secondly, he was of the view that Steering Committee should be constituted by the Government of India in the Ministry of Water Resources.

Thirdly, he was of the opinion that the Government of India should actively associate itself in the deliberations of the Steering Committee both on the technical as well as administrative side.



The summary of the discussions of the meeting is as follows:-

1. Districts from which the representative areas are to be selected.

It was decided that the representative areas to be studied in detail in the Stage-II period will be selected from the 4 districts of Hardoi, Lucknow, Unnao and Raibareilly taking into consideration :

- 1) that the representative area is in the command of the Hardoi Branch;
- 2) that the representative areas are from the blocks/units in which no work under the CAD programme has been undertaken ( according to the present progress and programme of Sharda Canal CAD Project.

## 2. Project Components

The Project components would include the modernization and renovation of the related existing irrigation and drainage systems as part of an integrated work plan

## 3. Topographic maps

The following procedures were confirmed for collecting the topographic maps of the Study area, located in the restricted area.

- 1) The Study Team submits to the Commissioner and Administrator the list of the required topomaps covering the above mentioned four (4) districts in accordance with the result of the discussion.
- 2) The CAD Authority and the Department of Area Development of the UP State Government take further steps required for collecting the maps.

## 4. Further Schedule

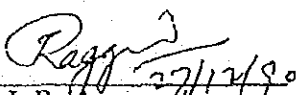
- 1) The second Steering Committee will be held for discussion of the Progress Report 1 to be submitted by the Study Team with the following schedule:

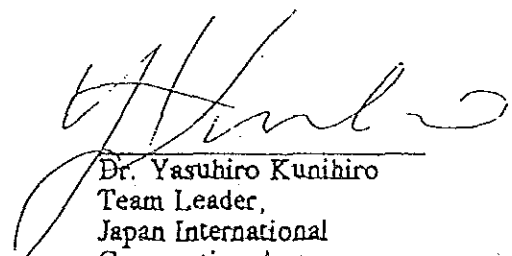
|                   |   |                             |
|-------------------|---|-----------------------------|
| Location          | : | Delhi                       |
| Date              | : | October 29, 1990            |
| Submission        | : |                             |
| Agenda            | : | One week before the meeting |
| Progress Report I | : | One day before the meeting. |


LIST OF ATTENDANTS TO THE MEETING WITH JICA ON OCT.16, 1990

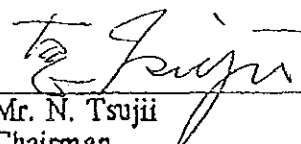
| <u>NO.</u> | <u>NAME</u>         | <u>DESIGNATION</u>   |
|------------|---------------------|--|
| 1          | Mr. J.R. Aggarwal   | Chief Engineer(CAD), Ministry of Water Resources, Delhi    |
| 2          | Mr. Harsh V. Sanwal | Secretary, Department of Area Development, U.P.            |
| 3          | Mr. Vinod Malhotra  | Administrator & Commissioner, Sharda-Sahayak CAD Authority |
| 4          | Mr. Ranbir Ahuja    | Special Secretary, Irrigation Department, U.P.             |
| 5          | Dr. G.N. Singh      | Directorate of Agriculture, U.P.                           |
| 6          | Mr. Krishna Chandra | Superintending Engineer, Irrigation Department             |
| 7          | Dr. D. Rai          | Ground Water Department U.P.                               |
| 8          | Mr. O.P. Chaturvedi | Additional Director, Sharda-Sahayak CAD Authority          |
| 9          | Mr. W.A. Siddiqi    | Executive Engineer, Irrigation Department                  |
| 10         | Mr. S.V. Singh      | Staff Officer (Sharda), Irrigation Department              |
| 11         | Mr. H. Kuronuma     | Co-Team Leader, JICA Study Team                            |
| 12         | Mr. M. Kobayashi    | JICA Study Team  |
| 13         | Mr. N. Sambe        | JICA Study Team  |
| 14         | Mr. Y. Yamada       | JICA Study Team  |
| 1          | Dr. P.K. Rao        | JICA Study Team  |
| 16         | Mr. K. Gotoh        | JICA Study Team  |
| 17         | Mr. K. Kyoizumi     | JICA Study Team  |
| 18         | Mr. W. Suido        | JICA Study Team  |

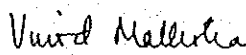
MINUTES  
ON  
INTERIM REPORT  
FOR  
FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD  
PROJECT

  
Mr. J. R. Aggarwal  
Chief Engineer(CAD)  
Ministry of Water Resources  
Government of India

  
Dr. Yasuhiro Kunihiro  
Team Leader,  
Japan International  
Cooperation Agency

  
Mr. Harsh V. Sanwal  
Secretary  
Department of Area Development

  
Mr. N. Tsujii  
Chairman  
JICA Advisory Committee

  
Mr. V. Malhotra  
Administrator & Commissioner  
Sharda Sahayak CAD Authority

New Delhi, India  
December 27, 1990

MINUTES  
ON  
INTERIM REPORT  
FOR  
FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD  
PROJECT

1. DATE : December 27, 1990  
2. PLACE : Shram Shakti Bhawan  
3. ATTENDANTS :

Central Government of India

Department of Water Resources

State Government of Uttar Pradesh

Department of Area Development

Department of Irrigation

Sharda-Sahayak CAD Authority

Name of all the attendants are as per attached list.

4. MINUTE OF DISCUSSION

- 1) The report was presented by Dr. Y. Kunihiro, Team Leader of JICA Survey Team and the procedure for selection of development blocks was explained by him. Based on their findings, the team have selected the following blocks as detailed below.

i) Representative area for improvement of irrigation condition

District : Lucknow  
Block : Sarojini Nagar  
Canal System : Lucknow Branch  
Amausi Distributary  
C.C.A. : 13,240 ha

ii) Representative area for improvement of drainage condition

District : Hardoi  
Block : Sursa

Canal System : Hardoi Branch  
Badaicha Distributary  
C.C.A. : 16,760 ha

iii) Representative area for improvement of salinity and alkalinity condition

District : Unnao  
Block : Purwa  
Canal System : Purwa Branch  
Ratausha Distributary  
C.C.A. : 11,870 ha

After a detailed discussion on the system of marking and constraints of various blocks, it was decided to include Sataon block with a C. C.A. of about 8,000 ha under District Rae Bareli for study under representative area for improvement of irrigation condition. This block is in addition to the above mentioned blocks

- 2) While discussing the collection of topo-maps and supplemental topographic survey, it was decided that Government of Uttar Pradesh would supply/assist on the following data.
  - i) Plain table survey for one chak in each of the above selected four(4) blocks at the scale of 1:500 would be supplied by the State Government. The average area of the typical chak would be around one hundred ha.
  - ii) Topo maps (at scale 1:50,000 and 1: 250,000) of the four(4) selected blocks would be arranged by the Government of Uttar Pradesh as per procedures already decided.
  - iii) Government of Uttar Pradesh would assist the team in procuring the remote sensing maps of the four (4) blocks as selected above.
3. The committee decided that the team may proceed with the work on the four(4) blocks as selected above in Para 1 under Phase II Program.

## LIST OF ATTENDANTS

### A. Central Government of India

|                    |                                 |
|--------------------|---------------------------------|
| Mr. J. R. Aggarwal | Chief Engineer, MOWR            |
| Mr. V. Rajagopalan | Deputy Secretary (CAD), MOWR    |
| Mr. Inder Mohan    | Deputy Commissioner (CAD), MOWR |

### B. State Government of Uttar Pradesh

|                     |   |
|---------------------|---|
| Mr. Harsh V. Sanwal | Secretary , Department of Area Development                    |
| Mr. V. Malhotra     | Administrator & Commissioner, Sharda Sahayak<br>CAD Authority |
| Prof. K.P. Jain     | Chief Engineer, Irrigation Department (Malmi<br>Okhla)        |
| Mr. Krishna Chandra | Superintending Engineer, Irrigation Department                |
| Mr. K.C. Ahuja      | Liaison Officer, Irrigation Department                        |
| Dr. D. Rai          | Ground Water Department                                       |

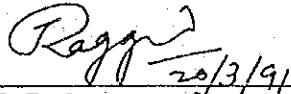
### C. JICA Advisory Committee

|               |                   |
|---------------|-------------------|
| Mr. N. Tsujii | Chairman          |
| Mr. M Ota     | Coordinator, JICA |

### D. JICA Study Team

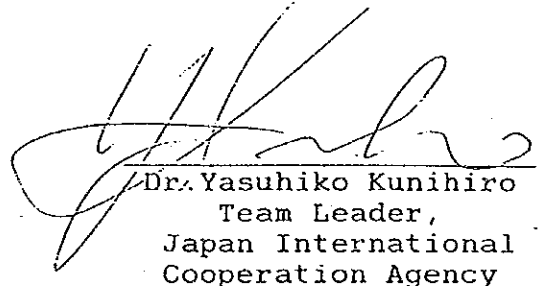
|                  |                 |
|------------------|-----------------|
| Dr. Y. Kunihiro  | Team Leader     |
| Mr. H. Kuronuma  | Co-team Leader  |
| Mr. K. Yamada    | JICA Study Team |
| Mr. M. Kobayashi | JICA Study Team |
| Mr. K. Kyoizumi  | JICA Study Team |

MINUTES OF MEETING  
ON  
PROGRESS REPORT (II)  
FOR  
THE FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT



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Mr. J.R. Aggarwal  
Chief Engineer (CAD),  
Ministry of Water Resources  
Government of India

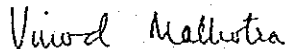


Dr. Yasuhiko Kunihiro  
Team Leader,  
Japan International  
Cooperation Agency



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Mr. Harsh V. Sanwal  
Secretary,  
Department of Area Development  
State Government of Uttar Pradesh



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Mr. V. Malhotra  
Administrator & Commissioner,  
Sharda Sahayak CAD Authority

New Delhi, India

March 20, 1991

MINUTES OF MEETING  
ON  
PROGRESS REPORT (II)  
FOR  
THE FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT

1. DATE : March 20, 1991
2. PLACE : Shram Shakti Bhawan
3. ATTENDANTS :

Central Government of India

Department of Water Resources

State Government of Uttar Pradesh

Department of Area Development

Department of Irrigation

Sharda-Sahayak CAD Authority

Department of Agriculture

JICA Study Team

Name of all the attendants are as per attached list.

4. MINUTES OF DISCUSSION

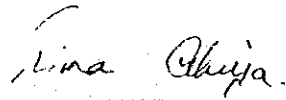
- 1) The report was presented by Dr.Y.Kunihiro, the Leader of the JICA Study Team, explaining thereby the data collection and further action points.
- 2) The Chief Engineer, CAD, requested the coordinating Government departments/agencies participants for their views in respect of data presented in the report. There was general agreement in this respect.



- 3) As a part of phase-I and phase-II programme, the study of four representative areas within Hardoi Branch Command has been completed and presented in the Meeting. While discussing the forthcoming schedule of the Project Study, it was resolved that as a part of the home works, JICA Team would submit a complete report of Sharda Canal System in accordance with Para.1 and 2 contained in the minutes of meeting held on April 19, 1990 between the Government of India, Uttar Pradesh State Government and JICA.
- 4) Intensive study has been carried out for the representative areas and the findings of the same would be used for the preparation of the Final Report of Sharda Canal CAD Project.
- 5) The Secretary, Department of Area Development, UP, requested that the final report should contain the executive summary, highlighting therein inter-alia, the time frame, detailed cost analysis and benefits, and other action points concerning the Government of India, the Government of Uttar Pradesh and JICA.
- 6) The UP Government officials also requested that the Final Report would give adequate coverage to the following:
  - (1) Utilization plan of available water sources in the Sharda Canal Project Area
  - (2) Sub-surface drainage plan with due attention to land slope and availability of outfalls
  - (3) Need for soil testing for micro-nutrient, etc. in the trial farms

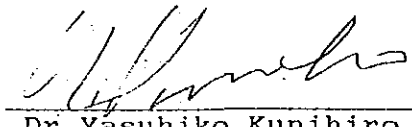
7) The Japanese Team deeply appreciated the help and cooperation extended by the Government of Uttar Pradesh and its many agencies. Mr.J.R.Aggarwal, CE(CAD) and Chairman, expressed his deep appreciation and thanks for preparing this report in such a short time. Mr.Sanwal, Co-chairman, while acknowledging the potential of the work done by JICA, expressed the hope that the Final Report on the action to be taken in the Sharda Canal Project would be a very useful document. Mr.Malhotra, Commissioner and Administrator of CADA, also conveyed his appreciations highlighting the enthusiasm with which the job was completed successfully.

MINUTES OF MEETING  
ON  
THE DRAFT FINAL REPORT  
FOR  
THE FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT



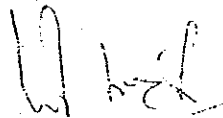
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Ms. Mina Ahuja  
Chief Engineer (CAD),  
Ministry of Water Resources  
Government of India



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Dr. Yasuhiko Kunihiro  
Team Leader,  
Japan International  
Cooperation Agency



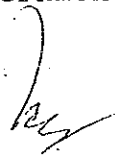
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Dr. Y. P. Singh  
Secretary,  
Department of Area Development  
State Government of Uttar Pradesh



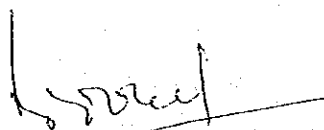
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Mr. Norikazu Tsujii  
Chairman,  
JICA Advisory  
Committee



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Mr. R.K. Singh  
Administrator & Commissioner,  
Sharda Sahayak CAD Authority



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Mr. Sayed Aushaf Ahmad  
Chief Engineer (Sharda Canal)  
Irrigation Department, U.P.

New Delhi, India

September 5, 1991

MINUTES OF MEETING  
ON  
DRAFT FINAL REPORT  
FOR  
THE FEASIBILITY STUDY  
ON  
IRRIGATION AND DRAINAGE DEVELOPMENT OF SHARDA CANAL CAD PROJECT

1. DATE : September 4-5, 1991
2. PLACE : Conference Room No.200, Shram Shakti Bhawan
3. ATTENDANTS :

Central Government of India

Department of Water Resources

State Government of Uttar Pradesh

Department of Area Development

Department of Irrigation

Sharda-Sahayak CAD Authority

JICA Advisory Committee

JICA Study Team

Name of all the attendants are as per attached list.

#### 4. MINUTES OF DISCUSSION

- 1) The study team submitted thirty (30) copies of the Draft Final Report to the Ministry of Water Resources, the Government of India, on September 3, 1991.
- 2) The report was presented by Dr.Y.Kunihiro, Leader of the study team, to the members of the Steering Committee, explaining all the study results, the proposed project plan and its feasibility.

- 3) The contents of the report were broadly discussed by the Steering Committee. While discussing various aspects of the report, U.P. Team lead by the Secretary of the Area Development expressed his concern on project cost, IRR calculations, management of tubewells, construction of parallel minors, maintenance of drains, canals and OFD works, foreign currency component and wireless communication system.

The study team appreciated the views of the members, and assured to examine the issues raised.

The members of the committee broadly agreed to the proposed development concept and approach adopted in the study.

- 4) Indian side shall present its final comments within one month period to JICA Tokyo through JICA representative office in Delhi.
- 5) JICA shall prepare the Final Report taking into consideration all the comments on the Draft Final Report from the Indian side, and submit the report to the Ministry of Water Resources within 2 months period after receiving the final comments.

## LIST OF ATTENDANTS

### A. Central Government of India

|                    |                                 |
|--------------------|---------------------------------|
| Ms.Mina Ahuja      | Chief Engineer (CAD), MOWR      |
| Dr.V.S.Dinker      | Joint Commissioner (CAD), MOWR  |
| Mr.Inder Mohan     | Deputy Commissioner (CAD), MOWR |
| Mr.E.V.Jagannathan | Joint Commissioner, MOWR        |

### B. State Government of Uttar Pradesh

|                   |  |
|-------------------|--|
| Dr.Y.P.Singh      | Secretary, Department of Area Development                  |
| Mr.R.K.Singh      | Administrator & Commissioner, Sharda Sahayak CAD Authority |
| Mr.S.A.Ahmad      | Chief Engineer (Sharda Canal), Irrigation Department       |
| Dr.D.Rai          | Ground Water Department                                    |
| Shr.T.Singh       | Superintending Engineer, Bareilly                          |
| Shr.L.P.Bhardwaj  | Superintending Engineer, VI circle, I.W. Lucknow           |
| Mr.V.K.Sharma     | Special Secretary, CAD, Lucknow                            |
| Mr.V.P.Mittal     | Assistant Engineer, Pohilkhand Canal Division, Bareilly    |
| Mr.O.P.Chaturvedi | Additional Director, Sharda Command, Lucknow               |

### C. JICA Advisory Committee

|               |          |
|---------------|----------|
| Mr.N.Tsujii   | Chairman |
| Mr.A.Hanatani | JICA     |

### D. JICA Study Team

|               |                             |
|---------------|-----------------------------|
| Dr.Y.Kunihiro | Team Leader                 |
| Mr.H.Kuronuma | Co-team Leader              |
| Mr.T.Kimijima | Member (project evaluation) |



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