CHAPTER VII

BEEL-WISE EFFECTIVENESS OF GEARS

RESEARCH HYPOTHESIS I

BEEL WISE ANALYSIS OF COST EFFECTIVENESS OF GEARS

INTRODUCTION

The various past works on the effectiveness of gears and methods have found to vary in their effectiveness in the different beels/lakes/reservoirs. For example, Yadav (1981) have found *Katal* fishing as the most effective one in Dhir beel (Assam); Dey et al. (1989) found *Dori* (trap) as the most effective in Sone beel (Assam); Amarasinghe et al. (1992) found gill netting is the only regular fishing method in both Minneria and Kaudulla reservoir in Sri Lanka. Like wise, Znamensky (1967), Sulochanan (1968) and Naidu et al. (1972) reported the superiority of frame nets (gill nets) over other gears. These findings have led to the following research hypothesis.

H_0: ***The level of effectiveness of gears varies across the different beels of Assam – i.e., if one type of gear is effective in a particular beel, the same may not be effective in the other beels. As such the level of effectiveness is influenced by the types of species available, their density and the hydrological condition of the beel.***

H_1: ***The level of effectiveness of various gears remains same in all the beels under study.***

In this chapter the results of the hypothesis I (on the basis of chapter IV), along with the fish species observed in the beel fisheries of Assam during the present research have been discussed.

REVIEW OF LITERATURE

No reports are available on the comparative economic viability of fishing gears in beel fisheries of Assam. But, various authors have reported similar works in the marine fisheries in different times. Yahaye and Wells (1980), Kuriyan and William (1982), Keshavan Nair, et al. (1984), Sathiadas and Paniker (1988), Dutta, et al. (1989), and Annamalai and Kandoran (1990) have reported on the comparative efficiencies of fishing gears used in marine waters. Likewise, Rao (1991) discussed about the efficiencies of gears in different fishing grounds. Similarly, Siluvai Raj et al. (1992) studied on economics of fishing units in the backwater of Kerala.

MATERIALS AND METHODS

To study the level of effectiveness of gears in different beels cost-effectiveness analysis was carried out following the formulae given in chapter 4. In addition, the factors, which determine the level of effectiveness of a particular gear, were also identified through group discussions in 55 beels of Assam. The responses from the interviews were recorded in the Semantic Differential Scale as shown in *Appendix I.*

OBSERVATION

The cost benefit studies of different gears as observed during the present research work have been shown in table- 7.1 (also in the tables and figures of Chapter IV), and described below for different beels of Assam.

KALIDANGA BEEL

The fishing gears are used in commercial fishing purposes are *dolijal, musharijal, berjal, phansijal, langijal, khewalijal,* and *hook and line fishing*. Though *dolijal* is found as the most effective gear in the beel, but other gears such as *musarijal, berjal, phansijal,* and *langijal* are also found economically effective. All the economic criteria are found within the feasible range, such as ROR from 46% (*khewalijal*) to 720% (*musarijal*); BCR from 3.15 (*khewalijal*); to 35.49 (*musarijal*); NKR from 3.54 (*khewalijal*) to 45.2 (*musarijal*); IRR from 57% (*khewalijal*) to 500% (*dolijal*); and NPV from Rs.10, 817/- (*khewalijal*) to Rs.17,22,807/- (*dolijal*). The CTOR is also found above the feasible range except in the case of *musarijal* (0.09). Hence, *musarijal* is considered as partially effective gear in this beel.

HAKAMA BEEL

The acquisition cost, operating cost, total cost and total revenue earned from the use of *musarijal, dolijal, berjal, phansijal, langijal, khewalijal* and hooks and line fishing is given in Table – 7.1. From the study of various economic parameters it is clear that *dolijal* is more feasible in comparison to other types of gears used in the beel. The B-C ratio was found between 1.46 (*khewalijal*) to 35.49 (*musarijal*) and the N-K ratio was recorded from 1.54 (*khewalijal*) to 45.2 (*musarijal*) showing that the gears can provide maximum benefit at least cost. Like wise, IRR was found between 23% (*khewalijal*) to 500% (*dolijal*) indicating economic viability of all gears. Similarly, the NPV also exhibited positive results of the use of the gears under study. Thus, all the gears used in this beel are found to be effective.

NANDINI BEEL

Dolijal, berjal, phansijal, langijal, khewalijal, and *hook and line fishing* are the main gears used in commercial fishing in this beel. All gear except hook and line are found above the effective range. The different economic parameters such as CTOR (1.3 to 8.19), ROR (18 to 631%), BCR (1.73 to 31.67), NKR (1.79 to 39.71), IRR (27 to 604%) and NPV (Rs.3379.91 to Rs.2244957/-) are found within the viable range.

Further, the analysis shows that *doilijal* is the most effective gear in the beel. On the other hand, all the economic parameters are found below the effective range in case of hook and line fishing, which indicates that the gear is not effective for commercial fishing in the beel.

HARINCHORA BEEL

Musarijal, berjal, phansijal, langijal, khewalijal, hook and line, and *parangijal* are the major gears of the beel in commercial fishing. The analysis shows that berjal is the most effective gear in the beel with its CTOR (4.54), ROR (336%), BCR (8.72), NKR (14.61), IRR (196%) and NPV (Rs.422099.8). Moreover, *musarijal, phansijal, langijal, khewalijal,* and *parangijal* are also found effective in all economic criteria. Hook and line fishing is the only gear, which is found not effective in the beel as far as the study of economic criteria are concern.

BARUNDANGA BEEL

For commercial purpose *musarijal, berjal, phansijal, langijal, khewalijal, hook and line,* and *parangijal* are found as the major gears of the beel. Among these gears *musarijal, berjal, phanssijal, langijal and khewalijal* are found effective in all economic criteria. The BDR (2.5 to 12.1) and NKR (1.27 to 23.64) show that the gears are able to provide maximum benefit at least cost. In case of hook and line fishing and *parangijal* all economic criteria are found either below the viable range or negative, which indicates the inability of these two gears to earn benefit against the required costs.

BHOISPURI BEEL

In this beel *musarijal, berjal, khewaijal, phansijal, langijal, hook and line,* and *parangijal* are found in commercial fishing. The analysis of economic criteria show that *khewalijal, phansijal,* and *langijal* are the effective gears in all criteria, such as CTOR (2.42 to 11.88), ROR (90 to 253%), BCR (5.45 to 8.55), NKR (6.19 to 16.4), IRR (99 to 212%) and NPV (Rs.12320/- to Rs.25933.60). *Musarijal* is found partially effective, because – CTOR (1.16), BCR (1.21), NKR (1.26), IRR

(23%), and NPV (Rs.11791.50) are found within the viable range but ROR (10%) is found below the feasible range. The study further show that hook and line fishing and *parangijal* are the two gears the economic criteria of which are found either below the viable range or negative as far as the analysis is concerned. Hence these two gears are recognized as not effective in this beel.

JOGRA BEEL

The major gears found in commercial fishing in the beel are *musarijal, berjal, khewalijal, phansijal, langijal, hook and line,* and *parangijal.* The economic criteria such as CTOR (1.1 to 2.52), ROR (24 to 117%), BCR (1.65 to 5.91), NKR (1.99 to 6.45) and IRR (35 to103%) are found above the feasible range for *musarijal, berjal, khewalijal, phansijal, langijal* and *parangijal.* Hook and line fishing is found not effective in the beel and all economic criteria except CTOR (1.62) are found either below the viable range or negative.

CHANDAKHAL BEEL

Musarijal, berjal, khewalijal, phansijal, langijal, hook and line, and *parangijal* are the main gears used for commercial purpose. In this beel all gears are found effective except hook and line fishing. The study of BCR (2.26 to 20.44) and NKR (2.49 to 28.22) show that the gears are able to provide benefit at least cost. On the other hand, all economic criteria except CTOT (1.18), for hook and line fishing are found below the feasible range.

SAGMARA BEEL

In this beel *musarijal, khewalijal, phansijal, langijal, hook and line,* and *ghatjal* are the main gears, which are used in commercial fishing. The analysis shows that *phansijal, langijal,* and *ghatjal* are the effective gears in all criteria, such as CTOR (1.41 to 2.29), ROR (32 to 55%), NPV (Rs.7975/- to Rs14379.31), BCR (2.24 to 3.75), NKR (2.53 to 3.99) and IRR (42 to 64%). *Musarijal,* on the other hand, found partially effective due to lower CTOR (0.47). Likewise, *khewalijal,* and hook and line

fishing are found economically not effective and all economic parameters except CTOR (1.25) are found below the viable range.

BORBILLA BEEL

The major gears of the beel, which are used in commercial fishing, are the *musarijal, khewalijal, phansijal, langijal, hook and line fishing,* and *ghatjal.* On the basis of all economic criteria *musarijal, phansijal,* and *langijal* are found effective in this beel. The study of BCR (1.58 to 6.43), and NKR (1.7 to 6.94) show that the gear is able to provide sufficient benefit at least cost. The IRR (26to 111%) and ROR (17 to 103%) also indicate the effectiveness of the gear in this beel. But *khewalijal, hook and line fishing* and *ghatjal* are found not effective in the beel. Except CTOR, all other economic criteria are found below the viable range.

BOTUAKAMAKHYA BEEL

In this beel *musarijal, khewalijal, phansijal, langijal, hook and line* and *ghatjal* are found in commercial fishing. Among the gears, *musarijal* is found as the most effective gear with CTOR (4.7), ROR (1.57), BCR (7.85), IRR (154%) and NKR (10.22). Other gears, which are found found economically viable, are *khewlijal, phansijal, langijal,* and *ghatjal.* The study further reveals that hook and line is the partially effective gear due to its lower ROR (10%).

SILIGURIJAN BEEL

The economic analysis shows that all the gears used in the beel such as *musarijal, dolijal, asrajal* and *phansijal,* are effective in all economic criteria. The BCR (1.3 to 9.54), and NKR (1.41 to 15.16) show that these gears can provide sufficient benefit at least cost. Among the gears *dolijal* is found as the most effective in comparison to other gears with CTOR (4.39), ROR (238%), NPV (Rs.580687.60), BCR (9.54), IRR (211%) and NKR (15.16).

DEEPAR BEEL

Musarijal, berjal, phansijal, langijal, dhenkijal, and *hook and line fishing* are the major gears of the beel. The economic study reveals that except hook and line all other gears are found effective. The economic criteria such as BCR (2.65 to 7.78) and NKR (2.98 to 10.5) indicate that these gears can provide maximum benefit at least cost. The ROR (39 to 161%) and IRR (48 to 156%) are also found above the feasible range. On the other hand, hook and line fishing is also found effective from the study of CTOR (1.3), NPV (Rs.728/-), BCR (1.17), IRR (16%), and NKR (1.2%), but ROR (11%) shows that the gear is unable to provide sufficient return to its costs, hence the gear is considered as partially effective in the beel.

SOLMARI BEEL

In this beel the data for economic analysis are available for only three gears namely *langijal, parangijal* and *khewalijal.* Of these three gears *langijal* is found to be most viable from the point of view of the economic indicators like CTOR (36), ROR (6.6 or 660%), BCR (17.04), IRR (460%), NPV (Rs.10342.50) and NKR (42.37). Further, the study reveals that *parangijal,* and *khewalijal* are also effective in all economic criteria.

MORI BEEL

The analysis reveals that all the gears used in the beel, such as *musari, khewalijal, phansijal, langijal, ghatjal,* and *horhorijal,* are effective in all economical criteria. The CTOR (1.54 to 7.79), ROR (52 to 1017%), BCR (2.51 to 37.8), IRR (43 to724%) and NKR (2.65 to 48.7) reveal that these gears are able to earn sufficient benefit against their respective investment and operational costs. Among all the gears *musarijal* is found as most effective gear in the beel as far as the present study is concern.

BORMONOHA BEEL

In Bormonoha beel also all the gears, which are used in commercial fishing, such as *musarijal, phansijal, langijal, horhorijal* and *ghatjal,* are found effective in all

economic criteria. As shown in table-7.1 all economic parameters are found above the feasible range. Among the gears, *khewalijal* is found as the most feasible gear from the economic point of view. The economic indicators such as CTOR (4.18), ROR (2.03 or 203%), B-C ratio (11.96), IRR (207), NPV (Rs.60497/-) and N-K ratio (13.09) are found maximum in case of *khewalijal.*

JALUGUTI BEEL

Musarijal, dolijal, khewalijal, phansijal, langijal, hook and line, and *horhorijal* are the major gears used for commercial purpose in this beel. The analysis reveals that except hook and line fishing all the other gears used in the beel are found effective in respect to their analysis. The economic criteria such as CTOR (1.58 to 8.57), ROR (19 to 166%), BCR (1.66 to8.86), IRR (26 to 142%), and NKR (1.72 to 10.71) exhibit the economic feasibility of the gear. On the other hand, except CTOR (1.37) all other economic parameters are found either below the viable range or negative for hook and line fishing. Hence, hook and line fishing has been considered as not effective in the beel.

KASODHORA BEEL

In this beel *langijal* is found as the most feasible gear as far as the economic analysis is concerned. All the economic indicators such as CTOR (4.35), ROR (187%), BCR (9.65), NPV (Rs.47026/-), IRR (182%) and NKR (12.06) are found above the viable range. Other effective gears in all criteria are *musarijal, dolijal, khewalijal, phansijal,* and *langijal.* On the other hand, parangijal is found partially effective due to its low ROR (07%). The analysis further show that hooks and line fishing is not effective and all the economic criteria are found below the feasible range.

KUJIBALIPATTI BEEL

Musarijal, dolijal, khewalijal, phansijal, langijal, hook and line, horhorijal, and *parangijal* are used in the beel for fishing purpose. The economic analysis reveals that except *khewalijal* all other gears are found effective in respect to their economic criteria such as CTOR (1.26 to 7.91), ROR (23 to 265%), BCR (1.34 to 14.36), IRR

(20 to 259%), and NKR (1.4 to 16.84). On the other hand, all the economic parameters for *khewalijal* are found below the feasible range; hence, it is considered as not effective in the beel.

DEORA BEEL

In this beel *musarijal, dolijal, khewlijal, phansijal, langijal, hook and line,* and *parangijal* are found in use for fishing purpose. Except hook and line all other gears are found effective in all economic criteria. The BCR (1.66 to 8.88), and NKR (1.79 to 16.77) indicate that the gears can provide sufficient benefit against the total operational cost required in fishing. Likewise, IRR (28 to 217%), and ROR (21 to 259%) exhibit maximum return against the required investments. Hook and line fishing is the only gear found as not effective in this beel.

THEKERA BEEL

Musarijal, berjal, khewalijal, phansijal, langijal, hook and line, horhorijal, and *parangijal* are the main gears, which are used in commercial fishing. Among these gears *khewalijal* is found economically most feasible gear in this beel in comparison to other types of gear with its CTOR (3.09), ROR (135%), BCR (7.69), NPV (Rs.37698/-), IRR (138%) and NKR (8.85). Other effective gears of the beel are *musarijal, berjal, phansijal,* and *langijal.* On the other hand, all economic criteria for hook and line fishing is found below the viable range.

UDORI BEEL

Udori beel is a riverine beel where *musarijal, khewalijal, phansijal, langijal, ghatjal, hook and line,* and *horhorijal* are the major gears used in fishing. The economic analysis reveals that all gears used in the beel for fishing purpose are economically effective in all criteria. The BCR (2.45 to 23.83), and NKR (2.71 to 29.98) reveals that the gear can provide maximum benefit at least cost. Likewise, ROR (37 to 461%) and IRR (44 to 450%) exhibit sufficient returns to the investment. Similarly, NPV is also found positive for all the gears used in the beel.

NANDINI-KARMARI BEEL

Musarijal, khewali, phansijal, langijal, ghatjal, hook and line, and *horhorijal* are found in operation during the present study. Among these gears *musarijal* is found as the most effective in comparison to other gears. The economic criteria such as CTOR (10.43), ROR (727%), BCR (34.12), IRR (675%), and NKR (46.27) are found higher than the other gears. Moreover, *khewalijal, phansijal, langijal, ghatjal* and *horhorijal* are also found economically effective. But, hook and line fishing is the only gear, which is found not effective for commercial purpose in this beel.

LAKHANABANDHA BEEL

Musarijal, khewalijal,phansijal, langijal, hook and line fishing are found in use for commercial purpose. The economic analysis shows that *musarijal, khewalijal, phansijal, langijal,* are the effective gears. The economic parameters such as CTOR (1.93 to 7.0), ROR (56 to 423%), BCR (3.41 to 20.74), IRR (61 to 396%) and NKR (3.77 to 26.53) are found within the viable range. On the other hand, hook and line fishing shows its inability to provide benefit and except CTOR (1.0) all other economic parameters are found below the viable range.

SATIYAN BEEL

The gears use in fishing purpose are *musarijal, berjal, khewalijal, phansijal, langijal, dhenkijal,* and *hook and line fishing.* Among the gears *musari, ber, phansi, langi* and *dhenkijal* are found as effective gears of the beel. The BCR (2.74 to 4.02) and NKR (2.75 to 7.45) reveals that the gears can provide well benefit at least cost. Likewise, IRR (45 to 119%), and NPV (Rs.9989.11 to Rs.111087.80) also found positive. But, *khewalijal,* and *hook and line fishing* are found as ineffective gears of the beel and except CTOR (1.04 and 1.58) all other economic criteria are found negative.

SIYALEKHAITY BEEL

The major gears of the beel used in fishing are *musarijal, khewalijal, phansijal, langijal, dhenkijal,* and *hook and line fishing.* The study on economic criteria reveals that *musarijal, khewalijal, phansijal, langijal,* and *dhenkijal* are the effective gears of

the beel. The economic criteria such as CTOR (1.79 to 4.01), ROR (24 to 198%), BCR (1.82 to 8.69), IRR (31 to 185%) and NKR (1.98 to 12.69) are found within the economic feasible range. On the other hand, the study show that *hooks and line fishing* is unable to provide benefit against the required operational costs and besides CTOR (1.48) all other economic criteria are found negative.

DIGHALI-PATALI BEEL

Musarijal, berjal, khewalijal, phansijal, langijal, dhenkijal, and *hook and line fishing* are the major gears of the beel. Among the gears *berjal, khewalijal, phansijal, langijal* and *dhenkijal* are found effective in all economic criteria. The CTOR (1.39 to 4.09), ROR (25 to 136%), BCR (1.91 to 8.36), IRR (33 to 143%), and NKR (2.06 to 8.98) reveal that these gears are able to provide sufficient benefit against their capital investments and required operational costs. The economic analysis further reveals that *musarijal,* and hook and line fishing are not effective. Though, ROR (12%) in case of *musarijal* is found viable but all other criteria are found below the feasible range. Likewise, in case of hook and line CTOR (1.56) is found effective but other criteria are found to be negative.

BRAHMAMAIJAN BEEL

In this beel *musarijal, khewalijal, phansijal, langijal, dhenkijal* and *hook and line fishing* are used in commercial fishing. The analysis shows that all the gears except dhenkijal are economically feasible in this beel. The economic criteria such as CTOR (1.92 to 9.02), ROR (19 to 204%), BCR (1.64 to 7.06), IRR (26 to175%), and NKR (1.69 to 13.36) are found as effective. But, except CTOR (1.08) all other criteria for *dhenkijal* are found negative indicating inability of the gear to earn required revenue.

SALCHAPRA BEEL

The gears used in commercial fishing are *musarijal, purjal, khewalijal, phansijal, langijal,* and *hook and line fishing.* Except hook and line fishing all other gears of the beel are found economically effective. The BCR (2.12 to 8.78) and NKR (2.24 to 10.23) reveals that these gears can provide maximum benefit at least cost. Likewise,

ROR (27 to155%) and IRR (36 to 159%) show sufficient return against the operational costs. Similarly, NPV is also found positive for all the effective gears. But, hook and line fishing is the only gear in the beel, which fails to provide benefit and except CTOR (1.91) all other economic criteria are found negative.

SIBNARAYANPUR ANUA

In this beel *musarijal, khewalijal, phansijal, langijal,* and *hook and line fishing* are found in use. The economic analysis reveals that except *phansijal* and hook and line fishing all other gears are economically effective in all criteria. The economic parameters such as CTOR (1.83 to 6.16), ROR (23 to 117%), BCR (1.81 to 4.99), IRR (30 to 112%), and NKR (1.94 to 7.8) are found within the economic feasible range. *Phansijal,* on the other hand, found partially effective because though ROR (24%), BCR (2.07), IRR (35%), and NKR (2.19) are found effective, but CTOR (0.97) is found below the viable range indicating the gear need more investment against its return. The study further reveals that hook and line fishing is not effective in the beel because all economic criteria are found in negative.

BASKANDI BEEL

The gears used in commercial fishing in this beel are *musarijal, purjal, khewalijal, phansijal, langijal* and *hook and line fishing,* and *parangijal.* Among these gears *purjal,* which is also known as *berjal* is found as economically most viable gear with the CTOR (4.07), ROR (259%), BCR (12.71), NPV (Rs.116385/-), IRR (253%) and NKR (16.72). The study further reveals that all gears use in the beel for commercial purpose are effective in all economic criteria as shown in table-7.1.

AUTI-BAUTI BEEL

In this beel *musarijal, purjal, khewalijal, phansijal, langijal, and hook and line fishing* are the major gears used in commercial purpose. Except *purjal,* all other gears are found economically effective. The economic parameters such as CTOR (1.98 to 4.5), ROR (33 to 259%), BCR (2.27 to11.34), IRR (41 to 239) and NKR (2.53 to 16.72) are found above the economic feasible range, which indicate the ability of the

gears to provide sufficient benefit at least cost. *Purjal,* is the only gear in the beel, which is found not effective and all the economic criteria for the gear are found negative.

TAPANG BEEL

Musarijal, purjal, khewalijal, phansijal, langijal, and *parangijal* are the major gears used in fishing purpose. Economic analyses show that *musarijal* is the most viable gear in the beel with its CTOR (4.02), ROR (2.37), NPV (Rs.397779.20), BCR (10.83), IRR (222%), and NKR (15.21). Other gears, which are found effective in all economic criteria, are *khewalijal, phansijal, langijal,* and *parangijal. Purjal* is the only gear of the beel, which fails to provide benefit and all economic criteria are found to be negative.

DIGARBAKRI BAIYA

In this beel m*usarijal, purjal, khewalijal, phansijal, langijal,* and *parangijal* are found as the major gears for commercial fishing. Except *purjal* all other gears are found economically effective. The economic parameters such as CTOR (1.37 to 2.57), ROR (19 to 78%), BCR (1.43 to 4.39), IRR (28 to 84%) and NKR (1.82 to 5.4) are found above the economic feasible range. The study further reveals that *purjal* is the only gear, which is unable to provide benefit against the required investment and operational cost.

RANI-MEGNA BEEL

The main gears, which are used in commercial fishing are *mahajal, jhankijal, phansijal, langijal, dhenkijal,* and *hook and line fishing.* Among these gears, *mahajal* and *phansijal* are found economically effective in all criteria. But *jhankijal* and langijal are found partially effective because though these gears are found effective from the study of CTOR, NPV, BCR, IRR and NKR, but ROR (7% and 9%) are found below the viable range. The study further reveals that *dhenkijal,* and hook and line fishing are not effective in the beel and except CTOR (1.97 and 2.25, respectively) all other criteria are found below the viable range.

SAGAR BEEL

In Sagar beel *mahajal, jhankijal, phansijal, dhenkijal, hook and line,* and *parangijal* are found as the major gears in commercial fishing. The economic analysis reveals that except *dhenkijal* and hook and line all gears used in the beel for fishing are economically viable in all criteria, such as CTOR (1.28 to 2.35), ROR (39 to 101%), BCR (2.75 to 6.48), IRR (49 to 112%) and NKR (3.01 to 7.03). On the other hand, except ROR (10%) all the other parameters for hook and line fishing are found above the feasible range, hence, the gear is recognized as partially effective. But, all economic parameters except CTOR (1.96) are found negative in case of *dhenkijal,* therefore, it is considered as not effective in this beel.

GOPHARCHANG BEEL

Mahajal, jhankijal, phansijal, dhenkijal, and *hook and line fishing* are the gears, which are used in commercial fishing. Except *dhenkijal,* and hook and line all other gears are found economically effective in all economic criteria such as CTOR (2.7 to 8.69), ROR16 to650%), BCR (1.65 to 27.5), IRR (26 to 580%), and NKR (1.7 to 41.28). Hook and line fishing, on the other hand, found partially effective, the ROR (8%) of which is found below the viable limit, though it is found effective in other criteria. But, except CTOR (1.57) all other economic criteria are found negative in case of *dhenkijal,* hence, it is considered as not effective in this beel.

ANGANG BEEL

In this beel *mahajal, jhankijal, phansijal, dhenkijal,* and *hook and line fishing* are the main gears, which are used in fishing. Among these gears *mahajal* and *hook and line fishing* is found effective in all economic criteria such as CTOR, ROR, BCR, IRR, and NKR. The analysis further reveals that *jhankijal* and *phansijal* are partially effective, because, though the ROR (9%) is found below the viable range, but all the other economic criteria are found within the feasible range. Again in case of *dhenkijal* though CTOR (1.49) is found effective but other vital criteria are found negative. Hence, *dhenkijal* is considered as not effective in this beel.

SONE BEEL

In Sone beel *musarijal, jhankijal, langijal, dhenkijal,* and *hook and line fishing* are found in use in commercial fishing. The economic analysis reveals that *mahajal,* is the most effective gear in the beel and all the economic criteria, such as CTOR (6.67), ROR (350%), NPV (Rs.972680.30), BCR (15.01), IRR (317%), and NKR (22.38) is found better in comparison to other economically effective gears, such as *jhankijal, langijal,* and hook and line fishing. The study further shows that *dhenkijal* fails to provide benefit against the cost needed for operation and except CTOR (1.92) all other economic criteria are found below the feasible range with negative NPV. Hence, *dhenkijal* is not effective in the beel.

RATA BEEL

In this beel *mahajal, jhankijal, langijal,* and *hook and line fishing* are found in commercial fishing. Except hook and line fishing all the gears are found economically effective in all criteria. The BCR (1.25 to 2.0), and NKR (1.29 to 2.17) show that the gears can provide maximum benefit at least cost. Likewise, CTOR (1.22 to 1.77), ROR (12 to 28%) and IRR (18 to 36%) reveal that the gear can provide maximum return against their costs required for the installation and operation of the gears. On the other hand, except CTOR (1.44) all other economic criteria for hook and line fishing are found negative in this beel indicating its inability to provide benefit against the required costs.

SAITALI BEEL

In this beel only *langijal, dhenkijal* and *hooks and line fishing* are found in use in commercial fishing. The study reveals that *langijal* is the only gear, which is found effective in all economic criteria. The economic parameters such as CTOR (1.73), ROR (17%), NPV (Rs.2671.47), BCR (1.49), IRR (24%), and NKR (1.6) reveals that the gear can provide sufficient benefit at least cost. The study further shows that *dhenkijal,* and hook and line are not effective in the beel and except CTOR (1.63 and 1.15 respectively). All other important economic criteria are found below the feasible range.

PUNGANI BEEL

In this beel *mahajal, berjal, phansijal, langijal, ghatjal,* and *hook and line fishing* are the major gears found in commercial use. The economic study reveals that except *ghatjal* all other gears found in the beel are economically effective. The BCR (3.56 to 7.99) and NKR (4.19 to9.94) show that the gears can provide maximum benefit at least cost. Likewise, NPV is also found positive. On the other hand, in case of *dhenkijal* except CTOR (1.39) all other economic parameters are found negative, hence, the gear is considered as not effective in the beel.

GANAK-DUBAI-DUBA BEEL

Barjal, phansijal, langijal, ghatjal, and *hook and line fishing* are the major gears in commercial use. Except hook and line fishing, all other gears used in the beel are found effective in all criteria. The CTOR (2.22), ROR (106%), BCR (5.13), IRR (105%), and NKR (7.03). But, except CTOR (1.94), all other economic criteria for hook and line fishing are found negative; hence, it is recognized as not effective gear of the beel.

GOROIMARI-BIHDIA-JOPORA BEEL

The fishing gears used in commercial fishing are *musarijal, khewalijal, phansijal, langijal, parangijal,* and *hook and line fishing.* The economic analysis reveals that all the gears used in the beel for commercial fishing purpose are economically effective in all criteria. Among these gears *musarijal* is the most effective gear with its CTOR (1.59 to 2.95), ROR (45 to 102%), BCR (2.95 to 6.01), IRR (53 to 107%) and NKR (3.25 to 6.84) reveals the ability of the gears to provide sufficient benefits against the required costs. On the other hand, except CTOR (1.23) and IRR (14.47%) all other criteria are found negative, hence, the gear is considered not effective in this beel.

MERKOLA BERIA BEEL

In this beel all the gears, such as *musarijal, khewalijal, phansijal, langijal, parangijal,* and *hook and line fishing* are found economically effective in all criteria. Among the gears *musarijal* is found as the most effective gear with its CTOR (3.05), ROR

(135%), NPV (Rs.327563/-), BCR (6.3), IRR (132%) and NKR (8.99). Further, the analysis shows that these gears can provide maximum benefit at least cost.

TINSULIBORBIL BEEL

Musarijal, khewalijal, phansijal, langijal, parangijal, and *hook and line fishing* are found as the major gears of the beel. Among these gears *musarijal, langijal,* and hook and line fishing are found effective in all economic criteria. The CTOR (2.05 to 4.49), ROR (65 to 175%), BCR (4.05 to 8.87), IRR (72 to 168%), and NKR (4.52 to 11.18) show that these gears can provide sufficient benefit at least cost. The study further reveals that *khewalijal, phansijal,* and *parangijal* are partially effective in the beel because, though the CTORs (0.46, 0.34 and 0.07) of the gears are found below the viable limit but other economic criteria are found economically effective.

MORIDISOI BEEL

In this beel *musarijal, khewalijal, phansijal, langijal, dhenkijal,* and *hook and line fishing* are found as the major gears used in fishing. All the gears used in the beel for commercial purpose are found effective in all economic criteria. The CTOR (1.13 to 5.17), ROR (21 to 258%), BCR (1.74 to 14.32), IRR (28 to 256%) and NKR (1.82 to 16.5) exhibits that these gears can provide sufficient benefits against their required both capital investment and operating cost.

BOTALIKHOSA BEEL

Musarijal, berjal, khewalijal, phansijal, langijal, dhenkijal, and *hook and line fishing* are the main gears found in commercial fishing. Analysis on economic parameters reveals that musarijal; berjal, khewalijal, phansijal, and langijal are the effective gears in all economic criteria. The CTOR (1.39 to 5.56), ROR (16 to 390%), BCR (1.46 to 17.26), IRR (58 to 356%) and NKR (1.55 to 24.78) are found within the feasible range, which indicates the ability of the gears to provide sufficient benefits against their required costs. On the other hand, in case of hook and line fishing except ROR (09%) all economic criteria are found within the viable range, hence, the gear is considered as partially effective. Again, in case of *dhenkijal* except CTOR (1.53) all

the criteria are found to be negative, hence, *dhenkijal* has been recognized as not effective in this beel.

BIHDIA BEEL

Musarijal, berjal, khewalijal, phansijal, langijal, dhenkijal, and *hook and line fishing* are the major gears of the beel. Among the gears *musarijal* is found as the most effective gear in all economic criteria, such as CTOR (3.25), ROR (156%), NPV (10.08), which are found above the viable range. On the other hand, in case of *khewalijal, dhenkijal,* and hook and line fishing except CTOR (1.78, 1.56 and 1.17 respectively) all other economic criteria are found either below the viable range or negative, therefore, these gears are recognized as not effective.

TELIADANGA BEEL

Musarijal, berjal, khewalijal, phansijal, langijal, dhenkijal, and *hook and line* are found in use for commercial purpose. The study reveals that except *khewalijal* all gears use in the beel are found effective in all criteria. The BCR (1.55 to 4.13), and NKR (1.62 to 4.42) show that the gears are able to provide sufficient benefit at least cost. Moreover, CTOR (1.04 to 2.75), ROR (17 to 78%), and NPV (Rs.2979/- to Rs.68598/-) are also found above the viable range. *Khewalijal* is the only gear of which all economic criteria are found below the feasible range, therefore, it is considered as not effective.

MORIDIKHOW BEEL

In this beel *musarijal, berjal, khewalijal, phansijal, langijal, dhenkijal,* and *hook and line fishing* are found in commercial use. The economic analyses show that all the gears used in the beel for commercial fishing are effective in all economic criteria. All economic criteria such as CTOR (1.49 to 2.82), ROR (22 to 133%), BCR (1.47 to 7.21), IRR (23 to 133%) and NKR (1.55 to 8.68) exhibit the ability of the gears to provide sufficient benefits against the capital investments and operational costs.

BATHA BEEL

In this beel *musarijal, phansijal, langijal, khewalijal, dhenkijal,* and *hook and line fishing* are found in use. Economic analysis reveals that *phansijal, langijal,* and *khewalijal* are the effective gears in the beel in all economic criteria with CTOR (1.29 to 3.07), ROR (46 to 133%), BCR (1.79 to 8.2), IRR (31 to 140%), and NKR (1.94 to 8.87). The analysis further shows that in case of *musarijal* except CTOR (0.09) all economic parameters are highly effective hence it is recognized as partially effective. On the other hand, in case of *dhenkijal,* except CTOR (1.53) all other parameters are found below the viable limit, therefore, this gear is considered as not effective. Similarly, incase of hook and line all criteria are found negative indicating its inability to provide benefit against its required cost. Hence it is also not effective in the beel.

MAILATA DIPLINGA BEEL

The major gears of the beel are *musarijal, phansijal, langijal, khewalijal, hook and line,* and *dhenkijal.* Except hook and line all the other gears used in the beel are found economically effective. The CTOR (1.41 to 2.86), ROR (35 to 110%), BCR (2.48 to 5.91), IRR (43 to 111%) and NKR (2.65 to 7.27) are found above the feasible range, which indicates that these gears can provide maximum benefit at least cost. Hook and line fishing is the only gear, all the economic parameters of which are found below the feasible range hence it is considered as not effective in this beel for commercial fishing.

RAUMARI BEEL

Musarijal, phansijal, langijal, khewalijal, hook and line, and *dhenkijal* are the major gears found in commercial fishing in this beel. Economic study reveals that *musarijal, phansijal, langijal,* and *dhenkijal* are the effective gears in the beel. The BCR (2.24 to 23.95) and NKR (2.53 to 28.42) show that these gears can earn maximum benefit at least cost. Likewise, CTOR (1.57 to 6.58), ROR (32 to 447%) and IRR (42 to 440%) are found within the feasible range. The study further reveal that *khewalijal,* and hook and line fishing are unable to earn the required revenue to become effective and all

economic criteria are found either below the viable range or negative (table-7.1), hence these gears are considered as not effective.

GATHIA BEEL

In this beel *musarijal, phansijal, langijal, khewalijal,* and *dhenkijal* are the main gears found in commercial use. Among these gears *musarijal, phansijal, langijal,* and *dhenkijal* are found effective as far as the economic analysis is concerned. The economic criteria like, CTOR (1.97 to 3.46), ROR (25 to 103%), NPV (Rs.6001 to Rs.29122.38), BCR (1.35 to 6.44), IRR (22to 111%), and NKR (1.49 to 6.94) exhibits the ability of the gears to earn sufficient revenue against the required costs in installation and operation of the gears. On the other hand, in case of *khewalijal,* except CTOR (1.28) all other economic parameters are found negative, hence the gear is considered as not effective.

Table-7.1 Economic Indicators Showing the Cost Effectiveness of Gears in Different Beels

Beel	Gears	C I(Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs.)	CTOR	ROR	NPV (Rs)	BCR	IRR (%)	NKR
Kalidanga	Musarijal	36000	5333	129200	134533	393750	259217	0.09	7.2	1591432.5	35.49	93	45.2
	Dolijal	54000	8000	130500	138500	420000	281500	7.78	5 21	1722807	25 89	500	33.16
	Benjal	42000	6000	90100	96100	151875	55775	3.61	1.33	321678.05	9.1	129	8.65
	Phansijal	4350	480.54	5370	5850 64	10560	4709 46	2.43	1.08	26942.62	6.19	113	7 26
	Langijal	4300	468.77	5380	5848 77	10560	4711.23	2.46	1.09	26932.68	6.24	113	7.26
	Khewalijal	4250	506	5130	5636	7590	1954	1.79	0 46	10817	3.15	57	3 54
	Hook and line	3450	90	6900	6990	14400	7410	4.17	2 15	42507	11 85	209	13.32
Hakama	Musanjal	45000	5833.33	50800	56633.33	105000	48366.67	0 09	7 2	1591433	35.49	93	45.2
	Dolijal	49000	7555.55	90700	98255 55	281250	182994 5	7.78	5.21	1722807	25.89	500	33.16
	Benjal	39000	5000	79900	84900	154000	69100	3.61	1.33	321678.1	6.29	180	11 57
	Phansijal	4900	590.47	7950	8540 47	15048	6507.53	3.07	1.33	38101 16	7.5	137	8.77
	Langijal	4800	561.9	7980	8511.9	13860	5348 1	2.88	1.11	30644.2	6.76	117	7.38
	Khewalijal	4850	576.19	6350	6926.19	7700	773.81	1.59	0 16	2623	1.46	23	1 54
	Hook and line	3500	391.66	5275	5666.66	7200	1533.34	2.06	0.44	7896	2.96	52	3.26
Nandini	Dolijal	58000	8333 33	100500	108833.33	475000	366166.7	8.19	6.31	2244957	31.67	604	39.71
	Benjal	34000	4933.32	41700	46633.32	136500	89866.68	4.01	2.64	543693.2	13.61	261	16.99
	Phansijal	4250	505 94	4250	4755.94	5544	788.06	1.3	0 18	3379.91	1.73	27	1.79
	Langijal	4400	548.8	7200	7748.8	12320	4571 2	2.8	1.03	25738.34	5.28	107	6.85
	Khewalijal	800	228 57	4450	4678.57	6050	1372	7.56	1.71	8279	6.07	152	11.35
	Hook and line	3450	350	5220	5570	3240	-2330	0.94	-0 68	-15934.2	-3.33	-56	-3.6
Harinchora	Musarijal	28000	3733.33	41800	45533.32	67500	21966.68	2 41	0.78	125003.8	4.7	87	5 46
	Benjal	31000	6333.32	63600	69933.32	140625	70691.68	4.54	3.36	422099.8	8.72	196	14.61
	Phansijal	4500	458.33	4325	4783.33	6336	1552.67	1.41	0.35	1238.39	1.24	18	1.27
	Langijal	4850	545.83	7950	8495.83	13860	5364.17	2.86	1.1	60849.41	6.38	115	7.36
	Khewalijal	5000	619	9550	10169	14520	4351	2.9	0 87	24725	5.09	93	5.94
	Hook and line	3400	323.8	5220	5543.8	5760	216.2	1 69	0 06	-265.28	0.93	10	0.92
	Parangijal	7500	1069.43	5600	6669.43	7560	890.57	1	0.12	994.5	1.08	15	1 13
Barundanga	Musari jal	27000	3650	47800	51450	82250	30800	3.04	1.14	180166.3	6.45	120	7.6
	Bar jal	24000	3250	60400	63650	83250	19600	3.47	0.98	108086.9	4.24	85	5.5
	Phansi jal	3800	366.66	6100	6466.66	7700	1233.34	2.03	0 32	5952.02	2.5	18	1.27
	Langi jal	4700	558.32	7940	8498.32	13860	5361	2.95	1 14	30050	5.56	110	7.39
	Khewali jal	750	214.28	4050	4264.28	7040	2775.72	9.39	3 7	16978	12.1	300	23.64
	Hook and Line	3600	400	3875	4275	3400	-875	0.94	-0.24	-7163 88	-0.69	-11	-0.99
	Parangi jal	7500	1180.54	5080	6260 54	6050	-210.57	0 81	0.03	-5876.14	0.49	6	0.22

	Gears	C I(Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs.)	CTOR	ROR	NPV (Rs)	BCR	IRR (%)	NKR
Bhoispuri	Musari jal	44000	6000	40600	46600	51250	4650	1.16	0.1	11791.5	1.21	23	1.26
	Bar jal	39000	5000	50000	55000	56250	1250	1044	0.03	-7911.5	0.83	7	0.79
	Khewali jal	800	228.57	7250	7478 57	9504	2025.43	11.88	2.53	12320	8.55	212	16.4
	Phansi jal	4450	502 77	6250	6752.77	10780	4027.23	2 42	0.9	23109.43	5.68	99	6.19
	Langi jal	4400	491.66	6420	6911.66	11550	4638	2.63	1.05	25933.6	5.45	105	6.89
	Hook and Line	3500	392.85	6820	7212.85	2520	-4692 85	0.72	-1.34	-30370.3	-7.09	-121	-7.67
	Parangi jal	7300	1241.66	4460	5701.66	5852	150 34	0.8	0.02	-2633.24	0.77	3	0.64
Jogra	Musari jal	55000	8750	79500	88250	138750	50500	2 52	0 91	285772.5	4.5	94	6.19
	Bar jal	34000	4933 32	49100	54033 32	83125	29091 68	2 44	1.17	167496	4.88	93	5.93
	Khewali jal	4900	590.47	5550	6140.47	7392	1251.53	1.51	0.26	5566	1.95	35	2.14
	Phansi jal	5100	553.33	6300	6853.33	11704	4850.67	2.29	0.95	27793 5	5.91	103	6.45
	Langi jal	4950	570 83	6450	7020.83	10780	3759.17	2.17	0.76	20865 27	4.51	82	5.21
	Hook and Line	3450	362.5	6020	6382.5	5600	-782.5	1.62	-0.23	-6517.53	-0.66	-12	-0.89
	Parangi jal	8000	1333.33	5580	6913.33	8820	1906.67	1.1	0.24	7898	1 65	35	1.99
Chandakhal	Musari jal	39000	5750	76200	81950	256500	174550	6.58	4047	1061466	20.44	410	28.22
	Bar jal	37000	4888.88	46400	51288.88	135000	83711.12	3.65	2.26	497921.8	10.86	215	14.46
	Khewali jal	4850	545 83	7800	8345.83	9900	1554.17	2.04	0 32	7265	2.26	41	2.49
	Phansi jal	5250	690 47	5400	6090.47	7920	1829.53	1.51	0.35	9715.55	2.65	47	2.85
	Langi jal	4950	544.44	7170	7714.44	13200	5485 56	2.67	1.11	31388.27	6.28	114	7.34
	Hook and Line	3650	379.16	7625	8004.16	4320	-3684 16	1 18	-1	-24335 9	-5 27	-89	-5.67
	Parangi jal	8000	1222.21	6450	7672 21	31500	23827.79	3 94	2.97	142901.9	12.75	268	18.86
Sagamara	Musari jal	19500	2150	19300	21450	28125	6675	0.47	0.34	32847.05	2.56	44	2.68
	Khewali jal	4700	488 88	3150	3638.88	3960	321 12	0.84	0.06	-413 68	0.92	10	0.91
	Phansi jal	4850	503.33	7920	8423.33	11088	2664.67	2.29	0.55	14379 31	3.75	64	3.99
	Langi jal	4900	533.33	4250	4783 33	6930	2146 67	1.41	0.44	10887.1	2.72	52	3.22
	Hooks and Line	3650	379.16	5220	5599.16	4560	-1039.16	1.25	-0.28	-7963.37	-1.05	-18	-1.18
	Ghat jal	5200	676.18	7350	8026 18	9680	1653 82	1.86	0.32	7975	2.24	42	2.53
Borbilla	Musari jal	37500	4875	70700	75575	82250	6675	2.19	0.17	26395.5	1.58	26	1.7
	Khewali jal	5400	575	7750	8325	6930	-1395	1.28	-0.26	-780.14	0.87	9	0.86
	Phansi jal	4900	513.33	7520	8033.33	13090	5056.67	2.67	1.03	29122 36	6.43	111	6.94
	Langi jal	4800	441.66	11450	11891.66	16632	4740.34	3 46	0.98	26802.88	6.08	104	6.58
	Hook and Line	3600	400	6820	7220	6720	-500	1.87	-0.14	-4842.64	-0.15	-271	-0.35
	Ghat jal	5800	847.61	7800	8647 61	8882.5	234.89	1.53	0.04	-973.34	0.87	8	0.83

Beel	Gears	C I (Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs)	CTOR	ROR	NPV (Rs)	BCR	IRR(%)	NKR
B. Kamakhya	Musan	24000	3111.09	71900	75011.09	112875	37863.91	4.7	1 57	221320.1	7.85	154	10.22
	Khewali jal	4700	488.88	10250	10738.88	14520	3781.12	3.08	0.8	21004	4.87	87	5.47
	Phansi jal	4950	523.33	6350	6873.33	8750	1876.67	1.77	0.38	3234.73	1.59	25	1 65
	Langi jal	4650	495.83	19900	20395.83	23760	3364.17	5.1	0.72	18217.05	4.2	77	4.92
	Hooks and Line	3650	379.16	5220	5599.16	6000	400.84	1.64	0.1	710	1.17	16	1.19
	Ghat jal	5200	716.18	8250	8966	10260	1294	1.97	0.25	5995	1.92	34	2.16
Siligurijan	Musari jal	41000	6450	73000	79450	187500	108050	4.57	2.63	6703.9	1.3	257	1 41
	Doli jal	41000	7027.77	75200	82227.77	180000	97772.23	4.39	2.38	580687.6	9.54	211	15.16
	Asra jal	4300	1000	5220	6220	8855	2635	1.26	0.37	12382	2.22	46	2.77
	Phansi jal	6000	777.77	10980	11757 77	12870	1112.23	2.14	0 18	4685.9	1.67	28	1.78
	Langi jal	4900	558.33	7350	7908.33	10560	2651.67	2.16	0.54	13548 8	3.14	59	3.76
	Horhon jal	4800	511.11	23120	23631.11	31920	8288.89	6.65	1.73	48840	9 67	174	11 17
Deepar Beel	Musan jal	39000	5750	76200	81950	144900	62950	3.7	1 61	384693 9	7.78	156	10.5
	Bar jal	34000	4933.33	49100	54033.33	85120	31086.67	2.5	0.91	179845	5.17	99	6 29
	Asrajal	4850	545.83	7800	8345 83	11880	3534.17	2.4	0.73	19521	4 4	79	5 02
	Phansijal	5100	553.33	6300	6853.33	12075	5221 67	2.4	1.02	30089.99	6 32	110	6 89
	Langi jal	4950	570.83	6450	7020.83	9000	1979.17	1.8	0 39	9847.07	2.65	48	2.98
	Dhenki jal	5800	847.61	7800	8647.61	13260	4612 39	2.3	0.79	19936	3.56	70	4.44
	Hook and Line	3600	400	3875	4275	4675	400	1.3	0.11	728	1.17	16	1.2
Solmari	Langi jal	250	125	7225	7350	9000	1650	36	6.6	10342.5	17.04	460	42.37
	Khewali jal	4700	473 34	8910	9383 34	25200	15816.66	5.4	3 36	95407	18.58	331	21.29
	Parangi jal	4500	433.34	14890	15323 34	22500	7176.66	5	1.6	42086 2	9.38	163	10 35
Mori Beel	Musari jal	21000	2583.33	47400	49983 33	213750	163766.67	7.79	10.17	1002470	37 8	724	48 7
	Khewali jal	5000	486.11	15265	15751.11	20900	5148.89	4.18	1.02	29361	6 32	109	6.87
	Phansi jal	5450	565	7150	7715	10560	2845	1.94	0.52	8986.63	2 51	43	2.65
	Langi jal	4800	450	15790	16240	18810	2570	3.92	0.54	13581.98	3.65	62	3 83
	Ghat jal	6000	803.57	5025	5828	9240	3240	1.54	0.54	17473	3.31	62	3.91
	Horhori jal	5100	508.33	26285	2693.33	32640	5846.67	6.4	1.15	33614	6.87	120	7.59
Bormonoha	Musan jal	45000	5833	98900	104733	148750	44017	3.3	0.98	247980.5	5.09	100	6.51
	Khewali jal	5000	486.11	15075	15561.11	25740	10178.89	5.15	2.03	60497	11.96	207	13 09
	Phansi jal	5450	565	6375	6940	8470	1530	1.56	0.28	7036.78	2.18	37	2 29
	Langi jal	5300	552.78	15920	16472.78	18700	2227.22	3.53	0.42	12096 38	3.36	57	3.52
	Ghat jal	5100	803.57	4330	4410.57	6142.5	1731.93	1 02	0.29	8132	2.08	39	2.36
	Horhori jal	5100	508.33	45050	45558.33	48840	3281.67	9.57	0.64	17736	4.04	72	4 48

Beels	Gears	C I (Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs)	CTOR	ROR	NPV (Rs)	BCR	IRR(%)	NKR
Jaluguti Beel	Musari jal	50500	8097.22	61900	69997.22	114000	44002.78	2.26	0.87	242895.8	4 05	87	3.85
	Doli jal	54000	8666.66	61900	70566.66	85500	14933.34	1.58	0.28	60902	1.71	37	2.13
	Khewali jal	4650	477.77	8600	9077.77	14300	5222.23	3.07	1.12	29957	6.62	117	7.44
	Phansi jal	4800	493.33	6300	6793.33	7700	906 67	1.6	0.19	3460.72	1.66	26	1.72
	Langi jal	4700	508.33	10170	10678.33	18480	7801.67	3.93	1.66	45633.6	8.86	164	10.71
	Hook and line	3500	375	6815	7190	4800	-2390	1.37	-0.68	-16226.2	-3.32	-56	-3.64
	Horhori	4900	533.33	34350	34883.33	42000	7116.67	8.57	1.45	41032	7.49	142	9.37
Kasodhara	Musari jal	57500	9652.77	51300	60952.77	100000	39047.23	1.74	0.68	207574	3.21	71	4.6
	Doli jal	52500	8541.66	40000	48541.66	85500	36958.34	1.63	0.7	197963	3 36	73	4.77
	Khewali jal	4450	529.16	7200	7729.16	8800	1070.84	1.98	0.24	4466	1.82	32	2
	Phansi jal	4400	471.66	6300	6771.66	8085	1313.34	1.84	0.29	6193.21	2.27	39	2.41
	Langi jal	4250	458.32	10135	10593.32	18480	7886.68	4.35	1.87	47026	9.65	182	12.05
	Hook and line	3800	416.66	6220	6636 66	5800	-836.66	1.53	-0.22	-7023.44	-0.59	-11	-0.85
	Horhon jal	4350	480.55	26300	26780.55	29760	2979.45	6.84	0.69	16184	4.09	75	4.72
	Parangi jal	3950	420.23	5330	5750.23	6048	297.77	1.53	0.07	26.69	1	12	1
Kujibalipatti	Musari jal	49000	7555.5	47600	55155.5	135000	79844.5	2 75	1 63	466021	7.21	153	10 51
	Doli jal	43000	7428.5	61800	69228.5	120000	50771.5	2.79	1.18	297509.4	5 74	118	7.92
	Khewali jal	5400	632.14	7200	7832.14	7920	87 86	1.47	0.02	-1878.66	0.7	4	0.65
	Phansi jal	5300	535	6320	6855	8470	1615	1.59	0.3	7176.98	2.17	39	2.35
	Langi jal	5250	541.66	11725	12266.66	20020	7933.33	3.81	1.51	46430.7	8.7	150	9.84
	Hook and Line	3850	429.16	6020	6449 16	7000	550 89	1.81	0.14	1540	1.34	20	1.4
	Horhori	5100	495	26295	26790	40320	13530	7.91	2.65	80767	14.36	259	16.84
	Parangi jal	5000	541.66	4600	5141.66	6300	1158.34	1.26	0.23	5003.3	1.91	31	2
Deora Beel	Musari jal	44000	6000	42500	48500	78000	29500	1.77	0.67	165613	4.06	76	4.76
	Doli jal	39000	5000	42000	47000	67500	20500	1.73	0.53	103254	2.89	58	3.65
	Khewali jal	900	257.14	5880	6137.14	8470	2332.86	9.41	2.59	14197	8.73	217	16.77
	Phansi jal	4950	523.33	7110	7633.33	10560	2926 67	2.13	0.59	15468.08	3.63	67	4.16
	Langi jal	4900	558.33	7230	7788.33	8800	1011.67	1.79	0.21	3882.24	1.66	28	1.79
	Hook and Line	4050	401.66	6925	7326.66	6720	-606.66	1.66	-0.15	-5890.62	0.27	-5	-0.45
	Horhori	4850	503.33	23035	23538.33	31920	8381.67	6.58	1.73	48806	8.88	167	11.06
	Parangi jal	4500	444 44	4050	4494.44	6160	1665.56	1.37	0.37	8040.3	2 6	45	2.79
Thekera	Musari jal	42500	6875	46700	53575	67500	13925	1.59	0.32	65464	2.03	42	2.54
	Ber jal	47500	8075	46700	54775	72000	17225	1.52	0.36	83122	2.13	45	2.75
	Khewali jal	4800	533.33	7850	8383.33	14850	6466.67	3.09	1.35	37698	7.69	138	8.85
	Phasi jal	4900	513 33	7120	7633.33	10560	2926 67	2.16	0.59	15520.04	3.66	67	4.17
	Langi jal	4600	504.75	7820	8324.75	8910	585.25	1.94	0.13	1199.7	1.21	17	1.26
	Hook and Line	3300	325	2825	3150	2400	-750	0.73	-0.23	-6242 54	-0.73	-13	-0.17

Beels	Gears	C I (Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs)	CTOR	ROR	NPV (Rs)	BCR	IRR(%)	NKR
Udori	Musari jal	42000	6000	46200	52200	115500	63300	2.75	1.5	368257.8	7.06	145	9.77
	Khewali jal	5250	541.66	10980	11521 66	35750	24228.34	6.81	4 61	146892	23.83	450	29 98
	Phansi jal	5450	565	7120	7685	9680	1995	1.78	0 37	9347.07	2 45	44	2.71
	Langi jal	5300	575	5360	5935	15840	9905	2.99	1.87	58308	9.88	183	12
	Ghat jal	6300	975	8250	9225	19950	10725	3 16	1.7	64252	8.86	170	11.19
	Hook and Line	3650	412.5	6050	6462.5	8400	1937.5	2.3	0.53	10221	3.36	61	3.8
	Horhori jal	5300	535	22990	23525	31920	8395	6.02	1.58	48713	8.42	156	10.19
Nandini-Karmari	Musari jal	34500	5043.35	103800	108843.35	360000	251156.65	1043	7.27	1539405	34.12	675	46.27
	Khewali jal	4250	541.66	7370	7911.66	9350	1438.34	2 2	0.34	6822	2.55	42	2 6
	Phansi jal	4150	454.16	4380	4834.16	7315	2480	1 76	0.6	13688.36	4.06	69	4.29
	Langi jal	4450	563.08	6380	6943.08	7700	759.92	1.73	0.17	3389.37	1.7	27	1.75
	Ghat jal	5300	691.66	6250	6941.66	15435	8493.34	2.91	1.6	49684	7.93	156	10.37
	Hook and Line	3350	337.5	6150	6487.5	2940	-3547.5	0 88	-1.06	-23498.5	-5.47	-94	-6.01
	Horhon jal	4100	425	23095	23520	28560	5040	6 97	1.23	29105	7.16	127	8.09
Lakhanabandha	Musari jal	19500	1958.33	52000	53958.33	136500	82541.67	7	4.23	497838.3	20 74	396	26.53
	Khewali jal	4100	424 99	8950	9374.99	11550	2175.01	2 82	0 75	11370	3.41	61	3 77
	Phansijal	4400	471.66	6300	6771.66	9240	2468.34	2.1	0.56	13342.66	3 75	65	4.03
	Langi jal	3850	391.66	4150	4541.66	7425	2883.34	1.93	0.74	15869.6	4.6	81	5.12
	Hook and Line	3350	327.77	5220	5547.77	3360	-2817.77	1	-0.65	-18940.4	-4 37	-73	-4.65
Satiyan	Musari jal	30500	2300	45200	47500	60000	12500	1.97	0 4	53295.7	2.39	45	2 75
	Ber jal	33000	5250	71200	76450	97500	21050	2.95	0.63	111087.8	3.15	68	4.37
	Khewali jal	4750	500	6650	7150	4950	-2200	1.04	-0.04	-16653	-2.21	-3.5	-2.29
	Phansi jal	4650	549.99	6725	7274.99	12375	5100	2.66	1.09	29994.21	7.02	119	7.45
	Langi jal	4850	576.18	7140	7716.18	9680	1963.82	2	0 4	9989.11	2.74	49	3.06
	Dhenki jal	7500	1208.33	11880	13088.33	19110	6021.66	2.55	0.8	33616	4 02	84	5.48
	Hook and Line	3550	354 16	6820	7174 16	5600	-1574.16	1.58	-0.44	-11279.1	-2 03	-34	-2.18
Siyalekhaiti	Musari jal	37500	4875	54200	59075	84012.5	24937.5	2.24	0.66	139443.5	4.09	75	4.71
	Khewali jal	5500	666.66	11350	12016.66	16632	4615.34	3.02	1.19	25636	4.63	88	5.66
	Phansi jal	5200	676.18	9200	9876.18	13167	3290.82	2.53	0.63	18747.81	4.23	74	4.61
	Langijal	4900	558.33	7080	7638.33	8800	1161.67	1.79	0.24	4811.34	1.82	31	1.98
	Dhenki jal	4400	1222.21	15050	16272.21	32130	15857.79	4.01	1.98	93567	8.69	183	12.69
	Hook and Line	3400	350	6740	7090	5040	-2050	1.48	-0 6	-14125.6	-2.92	-49	-3.15

Beels	Gears	C I (Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs)	CTOR	ROR	NPV (Rs)	BCR	IRR(%)	NKR
Dighali-patali	Musan jal	40000	2916.66	30550	33466.66	38250	4783.34	0.96	0.12	-5002	0.9	9	0.87
	Ber jal	35000	5250	32500	37750	48600	10850	1.39	0.31	54527	2.21	43	2 56
	Khewali jal	4750	500	5550	6050	7260	1210	1.53	0.25	5055	1.91	33	2.06
	Phansi jal	4800	493.33	6300	6793.33	8470	1678.67	1.76	0.35	8227.02	2.58	44	2.71
	Langi jal	4350	433.33	11450	11883 33	17820	5936 67	4.09	1.36	34716.51	8.36	143	8.98
	Dhenki jal	8000	1222.21	7070	8292.21	12600	4307.79	1.57	0 54	22073	2.82	59	3 76
	Hook and Line	3600	400	6220	6620	5600	-1020	1.56	-0.28	-8061.44	0 91	-16	-1.24
Brahmamaijan	Musari jal	26000	3566.66	41600	45166.66	60000	14833.34	2.31	0.57	81817	3.55	67	4 15
	Khewali jal	950	271.42	6590	6861.42	8800	1938.58	9026	2.04	11742	7.06	175	13.36
	Phansi jal	4800	493 33	6310	6803.33	9240	2436.67	1.92	0.5	12931.42	3.48	60	3 69
	Langi jal	4900	590.47	6410	7000.47	10780	3779.53	2.2	0.77	21214.84	4.64	84	4.64
	Dhenki jal	5300	741.66	7280	8021.66	5760	-2261.66	1.08	-0 43	-16579 7	-1.31	-26	-2.13
	Hook and Line	3850	379.16	6950	7329.16	8064	73484	2.09	0.19	2682	1.64	26	1.69
Salchapra	Musan jal	42500	7589.28	58200	65789.28	131625	65835.72	3.09	1.55	391212.8	7.18	150	10.21
	Pur jal	77500	12875	57900	70775	168750	97975	2.18	1.26	551994.5	5.11	116	8.17
	Khewali jal	4250	541.66	7700	8241.66	14850	6608.34	3 49	1.55	39229	8.79	159	10.23
	Phansi jal	4450	481.66	7110	7591.66	8800	1208.34	1.98	0.27	5529.83	2.12	36	2.24
	Langi jal	4400	548.8	6420	6968.8	8470	1501.2	1.92	0.34	7354.04	2.38	44	2 67
	Hook and Line	3350	337.5	6825	7162.5	6400	-762.5	1.91	-0.23	-6344.54	-0.71	-12	-0.89
Sibnarayanpur	Musari jal	74000	14500	34100	48600	135750	87150	1 83	1.17	503243.5	4.99	112	7 8
	Khewali jal	4750	547.61	3000	3547.61	4620	1072.39	6.16	0.23	4498	1.81	30	1.94
	Phansi jal	5100	700	3050	3750	4950	1200	0.97	0.24	6103.74	2.07	35	2.19
	Langi jal	4900	558 33	7190	7748.33	9680	1931.67	1.98	0.39	9577.64	2.64	48	2.95
	Hook and Line	3250	312.5	4150	4463.5	3240	-1222.5	0.99	-0.38	-9142.75	-1.6	-27	-1.83
Baskandi	Musari jal	59000	9777.77	48700	58477.77	117000	58522.23	1 98	0 99	327398	4.43	97	6.55
	Pur jal	74000	12000	97600	109600	301625	192025	4.07	2 59	116385	12.71	253	16 72
	Khewali jal	4450	563.08	11450	12013.08	14850	2836.92	3.34	0 64	15608	3.87	71	4 51
	Phansi jal	4350	574.99	7750	8324.99	17820	9495.01	2.18	2 18	57552.69	13.03	226	14.23
	Langi jal	4400	516.66	7990	8506.66	11880	3373.34	2.7	0.77	18743 64	4.51	83	5.26
	Hook and Line	3550	354.16	6420	6774.16	8250	1475.84	2.32	0.42	7414	2.89	50	3 08
	Parangi jal	5300	691.66	4580	5271.66	6982.5	1710.84	1.32	0.32	1507.46	1.21	18	1.28
Auti-Bauti	Musan jal	45000	8303.57	77200	85503.57	202500	116996 43	4.5	2.59	707220.5	11.34	239	16.72
	Pur jal	72500	11875	61700	73575	64500	-9075	0.89	-0.13	-80498	0.177	35	-0.11
	Khewali jal	4250	505.94	6600	7105.94	9240	2134.06	2.17	0.5	11312	3.25	59	3.66
	Phansi jal	5500	958 32	7800	8758.32	10890	2131.68	1.98	0.39	12613.9	2.94	54	3.29
	Langi jal	4350	504.16	7980	8484.16	9900	1415.84	2.27	0.33	6651.31	2.27	41	2 53
	Hook and Line	3500	361.11	6850	7211.11	9000	1788.89	2.57	0.51	9289	3.31	59	3.65

Beels	Gears	C I (Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs)	CTOR	ROR	NPV (Rs)	BCR	IRR(%)	NKR
Tapang	Musan jal	28000	4333.32	41700	46033.32	112500	66466.68	4.02	2.37	397779.2	10 83	222	15.21
	Pur jal	74000	12000	57100	69100	59125	-9975	0.8	-0.13	-86795.2	0.126	25	-0.17
	Khewali jal	5150	591.66	5500	6091.66	11800	5708.34	2.29	1.1	33171	6.69	117	7 44
	Phansi jal	5200	608.33	5700	6308.33	12540	6231.67	2.41	1.19	36778.79	7.62	128	8.07
	Langi jal	5600	689.28	8125	8814.28	11088	2273.72	1.98	0.41	11597.63	2.72	50	3.07
	Parangi jal	6500	875	5700	6575	15840	9265	2.43	1.43	60687.8	7.31	142	9 33
Digarbakri	Musari jal	51000	10321.41	28800	39121.41	70500	31378.59	1.38	0.61	175941	3.14	68	4.44
	Pur jal	71000	11749.99	49800	61549.99	53425	-8124.99	0.75	-0.11	-73891.3	0 23	46	-0.04
	Khewali jal	4750	604.75	8080	8684.75	9900	1215025	2	0.25	5528	1.96	34	2 16
	Phansi jal	5200	733.33	5400	6133.33	7128	994.67	1.37	0.19	4269.4	1.74	28	1 82
	Langi jal	5100	608.33	7250	7858.33	9680	1821.67	1.89	0.36	8798.38	2 41	45	2 72
	Hook and Line	3600	400	5220	5620	6600	980	1.83	0.27	4318	1.43	35	2.19
	Dhenki jal	6300	825	10400	11225	16200	4975	2.57	0.78	27731	4.39	84	5.4
Rani-Megna	Mahajal	45000	8303.57	77000	85303.57	168750	83446.43	3.75	1.85	499546	8 3	175	12.1
	Jhanki jal	4400	548.8	6550	7098.8	7425	326.2	1.68	0.07	81	1.01	12	1 02
	Phansi jal	4150	508.32	6550	7058.32	13200	6141.68	3.18	1 48	36684.21	9 18	157	9.84
	Langi jal	4450	563.08	5620	6183.08	6600	416.92	1.48	0.09	628.77	1.11	15	1 14
	Dhenki jal	4700	691.66	10340	11031.66	9240	-1791 66	1.97	-0.38	-12837.3	-1.14	-22	-1.71
	Hook and Line	3600	120	7620	7740	8100	360	2.25	0.1	-1252.54	0.7	4	0.65
Sagar	Mahajal	47500	8125	17100	25225	60750	35525	1.28	0.75	262895	3 7	79	5 19
	Jhanki jal	5250	589.28	4250	4839.28	6930	2090.72	1.32	0.39	10559	2 75	49	3 01
	Phansi jal	5600	741.66	6750	7491.66	13200	5708.34	2.35	1.01	33768.24	6 48	112	7.03
	Dhenki jal	5500	625	11975	12600	10780	-1820	1.96	-0.33	-13936.5	-1.13	-21	-1.53
	Hook and Line	3600	400	5225	5625	6000	375	1.67	0.1	574	1.13	15	1.16
	Parangi jal	8500	1263.88	5225	6493.88	11880	5386.12	1.39	0.63	28505.9	3.25	68	4 35
Gopharchang	Mahajal	48000	8857.14	106300	115157.14	430500	315342.86	8 96	6.5	1933852	27.5	580	41.28
	Jhanki jal	4250	505.94	8900	9405.94	11500	2094.06	2.7	0.49	11064	3 19	58	3 6
	Phansi jal	4150	508.32	17300	17808.32	18480	671.68	4.45	0.16	2874.91	1.65	26	1 7
	Dhenki jal	5000	720.23	7630	8350.23	7854	-496.23	1.57	-0.09	-5172.54	0.21	4	-0.03
	Hook and Line	3400	338.88	8825	9163.88	9450	286.12	2.78	0.08	53	1.01	12	1.02
Angang	Mahajal	45500	6986.11	41800	48786.11	157500	108713.89	3.46	2.39	646776.8	10.31	218	15.21
	Jhanki jal	4600	605.94	10200	10805.94	11220	414.06	2.44	0.09	570	1.09	15	1.12
	Phansi jal	4450	481.66	5460	5941.66	6336	394.34	1.42	0.09	491.19	1.09	14	1.11
	Dhenki jal	4700	591.66	8020	8611.66	7020	-1591.66	1.49	-0.34	-12137.3	-1.04	-122	-1.58
	Hook and Line	3600	383.33	6825	7208.33	7776	567.67	2.16	0.15	1663	1.39	21	1.46

Beels	Gears	C I (Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs)	CTOR	ROR	NPV (Rs)	BCR	IRR(%)	NKR
Sone Beel	Mahajal	45500	6986.11	135400	142386.11	303750	161363.89	6.67	3.5	972680.3	15.01	317	22.38
	Jhanki jal	4600	605.94	22500	23105.94	29700	6594.06	6 46	1.4	1091	1.17	17	1.23
	Langi jal	4000	458.32	22500	22958.32	26730	3771.68	6.68	0.94	21394.2	5.25	99	6.35
	Dhenki jal	4900	641.66	8480	9121.66	9405	283.34	1.92	0.05	-629.41	0.9	9	0.87
	Hook and Line	3450	362.5	11250	11612.5	12150	537.45	3.52	0.16	1653	1.42	22	1.48
Rata Beel	Maha jal	46000	6888.88	64700	71588.88	81250	9661.12	1.77	0.21	33577.7	1.49	31	1.73
	Jhanki jal	5400	555	4550	5105	6600	1495	1.22	0.28	6354	2	36	2.17
	Langi jal	4100	463.08	5640	6103.08	6600	496.92	1.61	0.12	1218.78	1.25	18	1.29
	Hook and line	3500	350	5450	5800	5040	-760	1.44	-0.22	-6291.2	0.68	-11	-0.79
Saitali	Dhenki jal	5300	741.66	8020	8761.66	8640	-121.66	1.63	-0.02	-3333 12	0.54	11	0 37
	Langi jal	4450	563.08	6390	6953.08	7700	746.92	1.73	0.17	2671.47	1.49	24	1.6
	Hook and Line	3900	380.54	4350	4730.54	4488.75	-241.79	1.15	-0.06	-3455.35	0.91	3	0.11
Pungani	Maha jal	30500	3652.77	37900	41552.77	68750	27197.23	2.25	0.89	152146 3	4.92	94	5.99
	Bar jal	30500	3652.77	40500	44152.77	90000	45847.23	2.95	1.5	268089.8	7.99	151	9.94
	Phansi jal	5700	717.85	10980	11697.85	20020	8322.15	3.51	1.46	49363.15	8.1	149	9.66
	Langi jal	5350	563.88	7375	7938.88	11220	3281.12	2.09	0 61	17108 4	3.56	66	4.19
	Ghat jal	5700	675	8695	9370	7920	-1450	1.39	0.25	-11744.5	-0.69	-13	-1 06
	Hook and Line	3600	366.66	6820	7186.66	11200	4013.34	3 11	1.11	23096	6.75	117	7.42
Ganakdubaiduba	Bar jal	27000	3876 66	27300	31176.66	60000	28823.34	2.22	1.06	162940.2	5.13	105	7.03
	Phansi jal	5700	615	11900	12515	15120	2605	2.65	0 46	12984 52	2.87	45	3.28
	Langi jal	5000	517.85	6200	6717.85	9240	2522.15	1.85	0.5	13297 9	3.41	59	3.66
	Ghat jal	5000	666.66	8020	8686.66	9180	493.34	1.84	0.09	621	1.09	16	1.12
	Hook and Line	3600	350	7420	7770	7000	-770	1.94	-0.21	-269.22	-0.93	11	0.92
G.B.Jopora	Musari jal	52000	9142.85	78600	87742.85	118125	30382.15	2.27	0.58	166674.8	3.13	66	4.2
	Khewali jal	5300	552.78	7350	7902.78	6545	-1357.78	1.23	-0.26	-11114.5	-1.23	14.47	-1.09
	Phansi jal	5700	615	9300	9915	15400	5485	2.7	0.96	30811.72	5.43	100	6.41
	Langi jal	5300	552.78	5550	6102.78	8470	2367.22	1.59	0.45	11943.28	2.95	53	3.25
	Dhenki jal	6300	889.28	10400	11289.28	15960	4670.72	2.53	0.74	26245	4.21	81	5.17
	Hook and Line	3800	416.66	6900	7316.66	11200	3883.34	2.95	1.02	22193	6.01	107	6.84
Merkolaberia	Musari jal	41000	7464.32	62100	69564.32	125000	55435.68	3.05	1.35	327563	6.3	132	8.99
	Khewali jal	4200	447.22	7770	8217.22	9900	1682.78	2.36	0.4	7879	2.48	46	2.87
	Phansi jal	5000	666.66	7450	8116.66	11495	3378.34	2.29	0.67	18479.45	3.82	74	4.69
	Langi jal	4300	469.44	8700	9169.44	9900	730.56	2.3	0 17	1864 8	1.33	23	1.43
	Parangi jal	4100	463.08	9300	9763.08	10395	631.92	2.54	0.15	2054.41	1.43	22	1.5
	Hook and Line	3600	383.33	6025	6408.33	8400	1991.67	2.33	0.56	10478	3.48	62	3.91

Beels	Gears	C I (Rs)	Depre.(Rs)	TOC (Rs)	T C (Rs)	T R (Rs)	PAT (Rs)	CTOR	ROR	NPV (Rs)	BCR	IRR(%)	NKR
Tinsuliborbil	Musari jal	41000	6319.44	78600	84919.44	155250	70330.56	3.79	1.71	412675.5	7.68	161	11.06
	Khewali jal	4450	563.08	7150	7713.08	9680	1966.92	0.46	0.44	10431	2 99	54	3.34
	Phansi jal	4700	531.66	11850	12381 66	13860	1478.34	0.34	0 31	7133.88	2.34	41	2.52
	Langi jal	4300	469 44	11330	11799.44	19305	7505.66	4.49	1.75	43802.05	8.87	168	11.18
	Parangi jal	500	125	6450	6575	7560	985	0.07	1.97	5851.07	6.74	167	12.7
	Hook and Line	3750	404.16	4870	5274.16	7700	2425.84	2.05	0.65	13196	4.05	72	4.52
Moridisoi	Musari jal	25000	3250	45500	48750	62500	13750	2.5	0.55	75164	3.49	60	4
	Khewali jal	5200	573.33	11050	11623.33	22880	11256 67	4 4	2.16	6678	11.36	211	13.84
	Phansi jal	4900	558.33	5200	5758.33	14520	8761.67	2.96	1.79	51855.34	9.88	179	11.58
	Langi jal	4700	533.33	5200	5733.33	8470	2736.67	1.8	0.58	14436	3.48	65	4.07
	Dhenki jal	4750	547.61	11750	12297.61	24540	12242.39	5.17	2.58	73641	14.32	256	16.5
	Hook and Line	4450	433.33	3650	4083.33	5040	956.67	1 13	0.21	3686	1.74	28	1.82
Botalikhosa	Musari jal	27000	4678.5	39900	44578.5	150000	105421.5	5.56	3.9	642046.2	17.26	356	24.78
	Ber jal	27000	4678.5	39900	44578 5	80000	35421.5	2.96	1.31	208746.2	6 29	129	8.73
	Khewali jal	4250	479.16	3750	4229.16	7040	2810 84	1 66	0.66	15335	4.05	73	4.61
	Phansi jal	4700	531.66	13500	14031.66	16320	2288.34	3.47	0.49	12147 88	3.28	58	3.58
	Langi jal	4250	506.66	4750	5256.66	5940	683.34	1.39	0.16	2336.55	1.46	73	1.55
	Dhenki jal	5300	741 66	8000	8741.66	8100	-641.66	1 53	-0.12	-6552	0.09	1.69	-0.24
	Hook and Line	3400	338.88	4350	4688 88	4987.5	298.62	1.47	0.09	127	1.03	13	1.04
Bihdia	Musan jal	28000	4000	43350	47350	91000	43650	3 25	1.56	254480.7	7 28	149	10.08
	Bar jal	34000	4933.32	32000	36933.32	55125	18191.66	1.62	0.54	38124.95	1.88	34	2.12
	Khewali jal	4450	563.08	7120	7683.08	7920	236 92	1 78	0.05	-485.54	0.91	10	0 89
	Phansi jal	4500	577.36	8700	5277.36	9460	4182.64	2.1	0.93	23925	5.31	99	6.32
	Langi jal	4250	541 66	61200	6741.66	9460	2718.34	2.22	0.64	14745.15	3.71	70	4046
	Dhenki jal	5300	741.66	7200	7941 66	8280	338 34	1.56	0 06	-485.72	0.93	10	0.91
	Hook and Line	3300	316.066	3310	3626 66	3850	223.34	1.17	0.07	-269.22	0.92	10	0.92
Teliadanga	Musan jal	25000	3472.22	45700	49172.22	62500	13327 78	2 5	0.53	68598	2.94	59	3.74
	Bar jal	25000	3472.22	45700	49172.22	68750	19627.78	2.75	0.78	35394	2.29	46	2.83
	Khewali jal	5300	603.57	3650	4253.57	4125	-128.57	0.78	-0.02	-3191.27	0 48	8.5	0.39
	Phansi jal	5500	660.71	3855	4515.71	7920	3404.29	1.44	0.62	18821.49	4.13	71	4.42
	Langi jal	5100	546.43	3845	4391 43	5280	888.57	1.04	0.17	3159.01	1.55	24	1.62
	Dhenki jal	5500	660 71	6615	7275 71	9450	2174.29	1.71	0.39	11009	2.68	49	3
	Hook and Line	3650	412.5	6820	7232.5	8000	767.5	2.19	0.21	2979	1.69	28	1 82

Table-7.2: Level of effectiveness of gears in different beels

Name of Gear	Most Effective Beels (Total nos.)	Effective Beels (Total nos.)	Partially Effective Beels (Total nos.)	Not Effective Beels (Total nos.)
Musarijal	Barundanga, Jogra, Chandakhal, Botua-kamakhya, Deepar beel, Moribeel, Nandini-karmari, Lakhanabandha, Sibnarayanpur, Auti-bauti, Tapang, Rani-megna, Gopharchang, Angang, Sone beel, Merkolaberia, Botalikhosa, Bihdia, Batha and Raumari beel. **(20 nos)**	Hrinchora, Borbila, Siligurijan, Bormonoha, Jaluguti, Kasodhora, Kujibalipatti, Deora, Thekera, Udori, Satiyan, Siyalekhaity, Brahmamaijam, Salchapra, Baskandi, Digarbakri, Sagar, Rata, Pungani, Goroimari-bihdia-jopora, Tinsuliborbil, Moridisoi, Teliadanga, Moridikhow, Diplinga-mailata and Gathia. **(25 nos.)**	Kalidanga, Harinchora, Bhoispuri, and Sagmara beel. **(4 nos.)**	Dighali-parali beel. **(1 no.)**
Dolijal	Kalidanga, Hakama, Nandini and Siligurijan beel. **(4 nos)**	-	-	-
Berjal	Harinchora, Baskandi, Pungani, Ganak-dubai-duba beel. **(4 nos)**	Kalidanga, Hakama, Nandini, Barundanga, Jogra, Chandakhal, Deepar beel, Thekera, Satiyan, Dighali-patali, Salchapra, Botalikhosa, Bihdia, Teliadanga, and Moridikhow. **(15 nos.)**	Rani-megna beel **(1 no)**	Bhoispuri, Auti-bauti, Tapang, Digar-bakri, and Gopharchang. **(5 nos.)**
Phansijal	Sagmara, Borbilla, Satiyan, Sagar, Teliadanga and Gathia beel. **(6 nos)**	Kalidanga, Hakama, Nandini, Harinchora, Barundanga, Bhoispuri, Jogra, Chandakhal, Botua-kamakhya,		-

		Siligurijan, Deepar beel, Mori, Bormonoha, Jaluguti, Kasodhora, Kujibalipatti, Deora, Thekera, Udori, Nandini-karmari, Lakhanabandha, Dighali-patali, Brahmamaijan, Salchapra, Sibnarayanpur, Baskandi, Auti-bauti, Tapang, Digar-bakri, Rani-megna, Gopharchang, Angang, Pungani, Ganak-dubai-duba, Goroimari-bihdia-jopora, Merkolaberia, Tinsuliborbil, Moridisoi, Botalikhosa, Bihdia, Moridikhow, Batha, Mailata-diplinga, and Raumari. **(45 nos.)**		
Langijal	Solmari, Jaluguti, Kasodhora, Dighali-patali, Saitali, Rata and Mailata-diplinga beel. **(7 nos)**	Kalidanga, Hakama, Nandini, Harinchora, Barundanga, Bhoispuri, Jogra, Chandakhal, Sagmara, Borbila, Botua-kamakhya, Siligurijan, Deepar beel, Mori, Bormonoha, Kujibalipatti, Deora, Thekera, Udori, Nandini-karmari, Lakhanabandha, Satiyan, Siyalekhaity, Brahmamaijan, Salchapra, Sibnarayanpur, Baskandi, Auti-		

		bauti, Tapang, Digar-bakri, Rani-megna, Sone, Pungani, Ganak-dubai-duba, Goroimari-bihdia-jopora, Merkolaberia, Tinsuliborbil, Moridisoi, Botalikhosa, Bihdia, Teliadanga, Moridikhow, Batha, and Raumari **(44 nos.)**		
Khewalljal	Bhoispuri, Bormonoha, Deora, Thekera, Udori, Brahmamaijan, Salchapra and Moridikhow beel. **(8 nos)**	Kalidanga, Hakama, Nandini, Harinchora, Barundanga, Jogra, Chandakhal, Botua-kamakhya, Siligurijan, Deepar beel, Solmari, Mori, Jaluguti, Kasodhora, Nandini-karmari, Lakhanabandha, Siyalekhaity, Dighali-patali, Sibnarayanpur, Baskandi, Auti-bauti, Tapang, Digar-bakri, Sagar, Gopharchang, Sone, Rata, Goroimari-bihdia-jopora, Moridisoi, Botalikhosa, Batha, and Raumari **(32 nos.)**	Rani-megna, Angang, and Tinsuliborbil. **(3 nos.)**	Sagmara, Borbila, Kujibalipatti, Satiyan, Merkolaberia, Bihdia, Teliadanga, Raumari, and Gathia. **(9 nos.)**
Hook and line Fishing	Goroimaari-bihdia-jopora beel. **(1 no)**	Kalidanga, Hakama, Brahmamaijan, Baskandi, Auti-bauti, Digar-bakri, Sagar, Gopharchang, Angang, Sone, Pungani, Merkolaberia, Tinsuliborbil,	Botuakamakhya, Deepar beel, and Botalikhosa. **(3 nos.)**	Nandini, Harinchora, Barundanga, Bhoispuri, Jogra, Chandakhal, Sagmara, Borbila, Jaluguti, Kasodhora, Kujibalipatti, Deora, Thekera, Udori, Nandini-

		Moridisoi, Teliadanga, Moridikhow. **(16 nos.)**		karmari, Lakhanabandha, Siyalekhaity, Dighali-patali, Salchapra, Sibnarayanpur, Rani-megna, Rata, Saitali, Ganak-dibai-duba, Bihdia, Batha, Mailatadiplinga, and Raumari **(29 nos.)**
Dhenkijal	Siyalekhaity, Digar-bakri-baiya, Moridisoi beel. **(3 nos)**	Sagmara, Botuakamakhya, Deepar, Mori, Bormonoha, Udori, Nandini-karmari, Satiyan, Dighali-patali, Ganak-dubai-duba, Teliadanga, Moridikhow, Mailata-diplinga, Raumari, and Gathia. **(15 nos.)**	Gorimari-bihdia-jopora. **(1 no)**	Borbila, Brahmamaijan, Rani-megna, Sagar, Gopharchang, Angang, Sone, Saitali, Pungani, Botalikhosa, Bihdia, and Batha. **(12 nos.)**
Horhorijal	Kujibalipatti beel. **(1 no)**	Siligurijan, Mori, Bormonoha, Jaluguti, Kasodhora, Deora, Udori, and Nandini-karmari beel. **(8 nos.)**	-	-
Parangijal	Tinsuliborbill beel. **(1 no)**	Harinchora, Jogra, Chandakhal, Solmari, Kasodhora, Kujibalipatti, Deora, Baskandi, Tapang, and Merkolaberia. **(10 nos.)**	Sagar **(1 no)**	Barundanga, and Bnhoispuri. **(2 nos.)**

FACTORS FOR LEVEL OF EFFECTIVENESS

Apart from the cost-effectiveness study in different beels opinions of the fishermen were recorded in the Semantic Differential Scale (Table-7.3) to evaluate the factors, which determine the level of effectiveness of gears. The study reveals that types of gears used in the beel fisheries are not the only factor that determines the level of effectiveness of a gear.

When the fish species availability is taken into consideration 84.99% fishermen supported the view that fish species are responsible for the effectiveness of a gear. On the other hand only 15.01% of them rejected the view. It has been also observed that 94.42% of the fishermen considered fish density as the main factor for the effectiveness of gears whereas 05.58% do not agree with the view. Lastly, when hydrological condition of the beel is considered as the factor, which can affect the level of efficiency of a gear 79.09% of fishermen rejected the view and 20.91% of them lightly supported the view.

Table- 7.3: The perception of fishermen about effectiveness of a gear

Factors	+2	+1	0	-1	-2
Fish species available	31.57	32.28	21.14	15.01	-
Fish density	43.68	34.09	16.65	05.58	-
Hydrological conditions	-	-	20.91	32.81	46.28

DISCUSSION

The study on cost effectiveness of *musarijal, dolijal, berjal, phansijal, langijal, khewalijal, hook and line fishing, dhenkijal, and parangijal* reveals that the level of effectiveness of gears varies across the different beels of Assam. Each beel has been observed to use 5 to 8 types of gears mainly in commercial fishing purpose. From the analysis it is evident that all the gears in a beel are not equally effective and exhibit a high range of variation in their level of effectiveness.

Table- 7.2 shows that out of 51 beels *musarijal* is most effective in 20 beels, effective in 26 beels, partially effective in 4 beels, and not effective in only one beel. It means the gear is able to earn sufficient benefit in most of the cases. Further, as shown in table-4.1 and fig.4.1 of chapter-IV, it is evident that the level of effectiveness on the basis of economic criteria, such as CTOR, ROR, BCR, IRR, NPV, and NKR the effectiveness of gear vary greatly in different beels.

Dolijal is found most effective in 4 beels out of 8 beels (Table. 7.2) where the study has been conducted. In other 4 beels the gear is found effective. But the levels of effectiveness on the basis of economic criteria have been found to vary in different beels (Table-4.2 and Fig. 4.2, chapter-IV).

In commercial fishing *Berjal* is found in 25 beels of which in 4 beels it is found as most effective. Moreover, the gear is found effective in 15 cases, partially effective in one case (i.e., in Rani-megna beel), and not effective in 5 cases on the basis of economic criteria. Further, the gear exhibits variations in the level of effectiveness in different beels (Table-4.3 and Fig. 4.3, chapter-IV).

The study on the basis of economic analysis it is evident that gill nets (*phanijal* and *langijal*) are the most feasible gears in the beel fisheries of Assam. Out of 51 beels *phansijal* is found most effective in 6 beels and effective in other 45 beels. That means in no cases the gear either partially effective or not effective. Though, the level

of effectiveness on the basis of economic criteria (table-4.4) and CPGH (table-5) vary in different beels but the gear is found to earn sufficient revenue in all the cases indicating its effectiveness in the beel fisheries of Assam. Similarly, the economic analysis (table-4.5) shows that out of 52 cases *langijal* is most effective in 7 beels (13.46%), effective in 44 beels (84.61%), and partially effective in only one beel (1.92%).

Thus, though the levels of effectiveness vary in different beels, both the gill nets, i.e., *phansijal* and *langijal* are found as the most suitable gears in the beel fisheries of Assam.

Out of 52 beels (table-7.2) *khewalijal* is found most effective in 8 beels (15.38%), effective in 32 beels (61.53%), partially effective in 3 beels (5.76%) and not effective in 9 beels (17.31%). Like other gears the level of effectiveness on the basis of economic criteria (table-4.6) and CPGH (table-5) are found to vary from beel to beel.

Hooks and line fishing is found in operation for the commercial purpose in 49 beels. In only one case (2.04%) i.e., Goroimari-Bihdia-Jopora beel the gear is found as most effective and in 16 cases (32.65%) it is found as effective on the basis of economic criteria (table-4.7). But in another 3 beels (6.12%) it is found to be partially effective. On the other hand, the gear is not effective in most of the cases (29 beels out of 49, i.e., 59.18%). In these beels all the vital economic parameters are found below the feasible range. Hence, the gear is not suitable in commercial fishing as far as the present research is concerned.

Dhenkijal is found in 31 beels of which only in 3 beels (9.68%) the gear is found as most effective, in 15 beels (48.39%) as effective, in 1 beel (3.22%) as partially effective, and 12 beels (38.71%) the gear is found as not effective (table-7.1). Like other gears the level of effectiveness in this case also vary across the beels (table-4.8).

The level of effectiveness of *horhorijal* is also found to vary in different beels (table-4.9). Out of 9 beels where the gear is found in commercial use, in only one case (11.11%) it is found as most effective. But in another 8 cases (88.89%) the gear is found as effective in all economic criteria such as CTOR, ROR, BCR, IRR, NPV, and NKR. In no beels the gear is found either as partially effective or as not effective. Hence, the gear is considered as the suitable one for the beel fisheries of Assam.

Finally, out of 14 beels only in one beel (7.14%), i.e., Tinsukiborbil, *parangijal* has been found as the most effective gear (table-7). The gear is found effective in 10 beels (71.43%) where all the economic indicators are found within the viable range. But in 1 beel (7.14%), i.e., Sagar beel it is observed as partially effective. Further, in two beels (14.28%), such as Barundanga and Bhoispuri beel the gear is found as not effective according to the economic analysis (table-4.10).

Thus, the analyses support the hypothesis that the level of effectiveness of gears varies across the different beels of Assam. It means if one type of gear is effective in a particular beel, the same may not be effective in the other beels.

From the study of responses recorded in the Semantic Differential Scale (table-7.3) it has been observed that the effectiveness of a particular gear also depends on the fish species available in the beel, fish density and to a lesser extent to the hydrological conditions of the beels. According to the study most of the fishermen (84.99%) opined that availability of fish species play a major role in the effectiveness of a gear. Moreover, to be an effective gear in a particular beel, the beel must contain sufficient fish density. This view is supported by 94.42% of the fishermen. But when hydrological condition of a beel has been put forwarded to fishermen most of them (79.09%) suggested that hydrological conditions of a beel do not play any major role in the effectiveness of a gear.

CONCLUSION

The cost effective analyses of gears in different beels reveal that the level of effectiveness of gears varies across the different beels of Assam. It means if one type of gear is effective in a particular beel, the same may not be effective in the other beels. As such the level of effectiveness may be influenced by the types of species available in the beel, their density and the hydrological condition of the beels.