Table S1. Formulation of various types of hedging rules.

1PHP		
$R_t = (WA_t / S_{a1.k}) * D_t$	$SP_t = 0$	$WA_t < S_{a1.k}$
$R_t = D_t$	$SP_t = 0$	$S_{a1.k} \leq WA_t < D_t+k$
$R_t = D_t$	$SP_t = WA_t-D_t-k$	$WAt, \geq Dt+k$
2PHP		
$R_t = (WA_t / S_{b1.k}) * D_t$	$SP_t = 0$	$WA_t < S_{b1.k}$
$R_t = [(WA_t - S_{b1.k})/(S_{b2.k} - S_{b1.k})]*D_t$	$SP_t = 0$	$S_{b1.k} \leq WA_t < S_{b2.k}$
$R_t = D_t$	$SP_t = 0$	$S_{b2.k} \leq WA_t < D_t+k$
$R_t = D_t$	$SP_t = WA_t-D_t-k$	$WA_t \geq D_t+k$
3PHP		
$R_t = (WA_t / S_{c1.k}) * D_t$	$SP_t = 0$	$WA_t < S_{c1.k}$
$R_t = [(WA_t - S_{c1.k})/(S_{c2.k} - S_{c1.k})] *D_t$	$SP_t = 0$	$S_{c1.k} \leq WA_t < S_{c2.k}$
$R_t = [(WA_t - S_{c2.k})/(S_{c3.k} - S_{c2.k})] *D_t$	$SP_t = 0$	$S_{c2.k} \leq WA_t < S_{c3.k}$
$R_t = D_t$	$SP_t = 0$	$S_{c3.k} \leq WA_t < D_t+k$
$R_t = D_t$	$SP_t = WA_t-D_t-k$	$WA_t \geq D_t+k$
DHP		
$R_t = D_t$	$SP_t = WA_t - D_t - k$	$WA_t \geq D_t + k$
$R_t = D_t$	$SP_t = 0$	$D_t \leq WA_t < D_t + k$
$R_t = HF1*D_t$	$SP_t = 0$	$V_3 \leq WA_t < D_t$
$R_t = HF2* D_t$	$SP_t = 0$	$V_2 \leq WA_t < V_3$
$R_t = HF3* D_t$	$SP_t = 0$	$V_1 \leq WA_t < V_2$
$R_t = 0$	$SP_t = 0$	$WA_t < V_1$
SOPHP		
$R_t = WA_t$	$SP_t=0$	$WA_t < S$
$R_t = F(h)$	$SP_t=0$	$S \leq WA_t < k$
$R_t = R_f$	$SP_t=WA_t - k$	$K \leq WA_t$
BSOPHP		
$R_t = 0$	$SP_t=0$	$WA_t < S$
$R_t = F(h)$	$SP_t=0$	$S \leq WA_t < k$
$R_t = R_f$	$SP_t=WA_t - k$	$K \leq WA_t$
SHPHP		
$R_t = 0$	$SP_t= 0$	$WA_t < S1$
$R_t = F(0.25 * CT, h)$	$SP_t= 0$	$S1 < WA_t < S2$
$R_t = F(0.50 * CT, h)$	$SP_t= 0$	$S2 < WA_t < S3$
$R_t = F(0.75 * CT, h)$	$SP_t = 0$	$S3 < WA_t < S4$
$R_t = F(CT, h)$	$SP_t = 0$	$S4 < WA_t < k$
$R_t = F(CT, h_{max})$	$SP_t = WA_t - k$	$k < WA_t$

WAt: Water availability at time t; Rt: Release at time t; Dt: Target demand in time t; SPt: Spill at time t; K: Active storage; Sa1.k: Reservoir storage at the first point of 1PHP; Sb1.k and Sb2.k : reservoir storage at the first (b1) and second (b2) changing points of 2PHP; Sc1.k, Sc2.k, and Sc3.k: reservoir storage at the first (c1), second (c2) and third (c3) changing point of the 3PHP; HF1, HF2, and HF3: the fraction of target demand at stage-I, stage-II, and stage-III respectively; V1, V2, and V3: hedging trigger-volumes at stage-I, stage-II, and stage-III respectively; S: minimum required storage to produce target power; *F* (h): function of head, which depends on hydropower reservoir system characteristics; Rf: minimum required release to produce target power at time of maximum net head; CT: full capacity of turbines; h: net head; hmax: maximum net head; *F*: release is function capacity and net head.

Table S2. Characteristics of Jor dam and Jor reservoir (Reference: TNB).

Jor dam	**Description**
Jor dam type	Earth fill
Dam height	45 m
Crest length	152.4 m
Crest level	496.8 m
Spillway	
Type of spillway	Siphon Bell mouth
Crest elevation	493 m
Max discharge capacity	1104 m^3/sec
Reservoir	
Normal water level	493 m
Reservoir flood level	497 m
Reservoir capacity	3.8 Mm^3
Surface area at FSL	0.3 km^2
Catchment area	275 km^2
Minimum water level	486.1 m

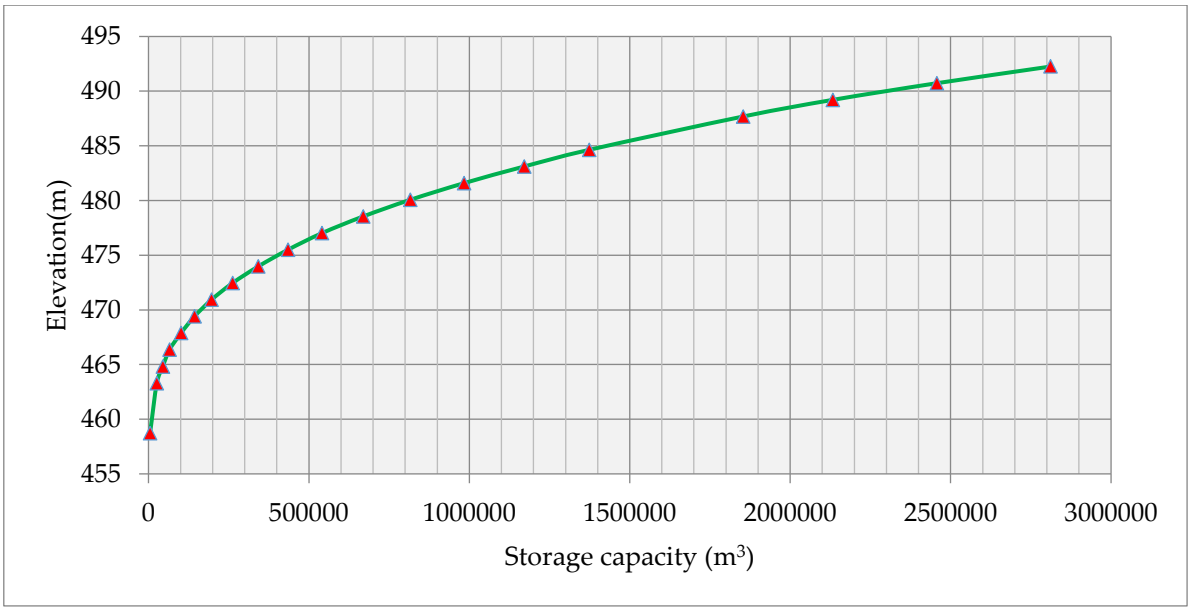

Figure S1. Relationship between elevation and storage capacity of Jor Reservoir.