**7.2.3 Discharge/design discharge**  
The discharge available for energy production depends on  
hydrology, the ecological flow to remain in the riverbed,  
irrigation requirements, leakage, evaporation, and other water  
consumption.  
A flow duration curve (FDC) is a statistical representation  
of the amount of hydrologically available water, and the  
distribution or characteristics of annual flows. A rather flat  
FDC implies a constant flow with low fluctuations and small  
differences between low and high flows. A steep FDC indicates  
large flow differences between dry and flood seasons, and high  
variability.  
Typically, the choice of design discharge—a run-of-river  
scheme or a storage power plant—is based on hydrological  
characteristics, in addition to energy demand, topographical  
conditions, environmental and social considerations, and other  
factors.  
Besides general considerations, design discharge selection for  
specific conditions of topography, hydrology and geology should  
be based on an optimization procedure to maximize natural  
resource exploitation while satisfying private and public interests.  
The design discharge is optimized by comparing project  
benefit/cost for each design discharge alternative. This is done by  
discounting CAPEX (capital expenditure), OPEX (operational  
expenditure) and revenues from electricity generation, and  
calculating financial indicators for each alternative. As financial  
indicators, usually the internal rate of return (IRR), the net  
present value (NPV), benefit/cost (B/C) ratio and the levelized  
cost of electricity generation (LCOE) are used.  
Figure 7-5 shows an example of the estimated IRR in  
relation to the design discharge; the optimum design discharge  
is reached at 51 m³/s. Stepwise changes of the IRR are caused by  
stepwise changes of costs of different turbine units and changes  
to penstock diameter.