

BUREAU OF INDIAN STANDARDS

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भारतीय मानक मसौदा

नदी घाटी परियोजनाओं से सम्बंधित शब्दावली

[IS 4410 (भाग 11 अनुभाग 1) का पहला पुनरीक्षण]

Draft Indian Standard

GLOSSARY OF TERMS RELATING TO RIVER VALLEY PROJECTS

PART 11 HYDROLOGY Section 1 General Terms

[*First Revision of IS 4410 (Part 11 Sec 1)*]

**Ground Water and Related
Investigations Sectional
Committee, WRD 3**

**Last Date for comments:
05/03/2023**

FOREWORD

(Formal Clause will be added later)

This Indian Standard (Part 11/Sec 1) was adopted by the Indian Standards Institution on 24 February 1972, after the draft finalized by the Terminology Relating to River Valley Projects Sectional Committee had been approved by the Civil Engineering Division Council.

A number of Indian Standards has been published covering various aspects of river valley projects and a large number of similar standards is in the process of formulation. These standards include technical terms, the precise definitions of which are required to avoid ambiguity in their interpretation. To achieve this, the Institution is bringing out 'Indian Standard Glossary of terms relating to river valley projects' (IS : 4410) which is being published in parts. The other parts of this standard so far published are given on P 10.

The first revision of the Indian Standard is taken up in the view of changing glossary over the time. The Indian Standard contain the changes as follows:

Various definition such as Brook, drought, Ice sheet, Ice Cap etc. are redefined.

Part 11 covers the important field of hydrology which is a separate science by itself. In view of the vastness of the subject, it is proposed to cover the subject in different sections. Section I covers general terms. Other sections in the series will be the following:

Section 2	Precipitation and run off
Section 3	Infiltration and water losses
Section 4	Hydrographs
Section 5	Floods
Section 6	Ground water
Section 7	Discharge measurements
Section 8	Quality of waters

In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country. This has been met by deriving assistance from the following publications:

UNITED NATIONS. ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST.
Glossary of hydrologic terms used in Asia and Far East. 1956. Bangkok.

INDIA. INTERNATIONAL COMMISSION ON IRRIGATION AND DRAINAGE.
Multilingual technical dictionary on irrigation and drainage, 1967.

INDIA. CENTRAL BOARD OF IRRIGATION AND POWER. Glossary of irrigation and hydro-electric terms and standard notations used in India, 1954. Manager of Publications, Delhi.

American Society of Civil Engineers. Nomenclature for hydraulics. 1962. New York.

All the definitions taken from Multilingual Technical Dictionary on Irrigation and Drainage' are marked with asterisk (*) in the standard.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

The list of standard referred in this Indian Standard is given at Annex A.

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1 SCOPE

1.1 This standard (Part 11/Sec 1) covers definitions of general terms relating to hydrology.

2 REFERENCES

The standards listed below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

3 GENERAL TERMS

3.1 Anchor Ice — Ice formed below the surface of a stream or other body of water on the stream bed or upon a submerged body or structure.

3.2 Arid — A term applied to regions where precipitation is so deficient in quantity, or occurs at such times, that agriculture is impracticable without irrigation.

3.3 Avalanche — A moving mass of debris, snow and ice, sliding rapidly down a mountain slope.

3.4 Barograph — An instrument designed for automatic recording of atmospheric pressure.

3.5 Barometer — An instrument for measuring pressure of the atmosphere.

3.6 Brook — Small shallow stream, usually continuous in its discharge, which flows in somewhat turbulent manner; its channels are usually irregular in shape and have numerous boulders ledges or small drops which cause the turbulent flow.

3.7 Climatic Cycle — Actual or supposed recurrences of such weather phenomena as 'Net and dry years, hot and cold years, at more or less regular intervals, in response to long-range terrestrial and solar influences.

3.8 Climatic Year — Continuous twelve-month period selected for presentation of hydrologic and meteorologic data.

3.9 Climatology — It is a subdivision of meteorology which deals with the average or normal or collective state of the atmosphere over a given area within a specified period of time. It implies the study of climate including the statistical relations, mean values, normals, frequencies, variations and distribution of meteorologic elements.

3.10 Cryology — The science of ice in all its forms, such as snow, ice and hail.

3.11 Drainage Area Drainage Basin, Catchment, Catchment Area, Catchment Basin, River Basin — The area from which a lake, stream or waterway and reservoir receives surface flow which originates as precipitation.

3.12 Drought — Variability of rainfall leading to rainfall deficiency and water shortage causes drought. In general, an extended period of dry weather or a period of deficient rainfall that may extend over an indefinite number of days, without any set quantitative standard by which to determine the degree of deficiency needed to constitute a drought.

Types of droughts:

- Meteorological Drought – referring to lack of precipitation.
- Agricultural drought – referring to lack of moisture in the soil where crops grow.
- Hydrological drought – referring to low levels of water in reservoirs.
- Socio-economic drought – referring to water shortages affecting people in society, which impacts availability of foodgrains, fodder, etc.

3.13 Dry Weather Flow — The flow of water in a stream during the non-rainy season.

3.14 Effluent Stream, Gaining Stream — A stream or stretch of stream which receives water from ground water in the zone of saturation, The water surface of such a stream stands at a lower level than the water table or piezometric surface of the ground water body from which it receives water. Also, a stream flowing out of another stream or out of a lake.

3.15 Ephemeral Stream — Stream that flows only in direct response to precipitation, receiving no water from springs, and no long-continued supply from melting snow or other surface source' its channel is at all times above the water-table.

3.16 Frazil Ice — Fine spicules of ice found in water too turbulent for the formation of sheet ice. It forms in supercooled water when the air temperature is far below freezing. In some cases the number of spicules per mil is very large and it resembles a mass of snow. Frazil ice may extend to the bottom of the stream and dam its flow, thus causing property damage or stopping water wheels.

3.17 Frost — A light feathery deposit of ice caused by the condensation of water vapour directly in the crystalline form, on terrestrial objects whose temperature is below freezing, the process being the same by which dew is formed, except that the latter occurs only when the temperature of the bedewed object is above freezing.

3.18 Geo-hydrology or Ground Water Hydrology — That branch of hydrology relating to sub-surface or subterranean waters.

3.19 Glacier — Body of land ice formed from recrystallized snow accumulated on the ground; may form where annual accretion of snow is greater than ablation by run off and evaporation. There are two broad classes:

- a) *Ice Streams* — which form in mountain valleys and move down slope under gravity; and
- b) *Ice Caps* — which cover large land masses and spread out radially because of great pressures built up by their weight (*see* also **3.32**).

3.20 Glacier Burst — A sudden release of a volume of water which has been impounded within or by a glacier.

3.21 Glaciometer — An instrument for measuring glacial motion.

3.22 Head Water

- a) The water upstream of a structure, and
- b) The flow in the upper reaches of a stream near its source.

3.23 Humid — Term applied to land or climates where precipitation is adequate in amount and occurs at such times that agriculture can be carried out without irrigation.

3.24 Hydrogeology — That branch of geology relating to effect of water on earth.

3.25 Hydrography — The science of measuring and analysing the flow of water, precipitation, evaporation, and allied phenomena, Also the science of measuring charting and mapping and studying oceans, seas, rivers, and other waters and their marginal land areas.

3.26 Hydrologic Cycle — A phenomena relating to circulation of water from the sea, through the atmosphere to the land, and thence, often with many delays, back to the sea or ocean through various stages and processes, for example, precipitation, interception, run off, infiltration, percolation, ground-water storage, evaporation and transpiration. Also the many short circuits of the water that is returned to the atmosphere without reaching the sea.

3.27 Hydrologic Equation — The water inventory equation (inflow = outflow \pm change in storage) which expresses the basic principle that during a given time interval the total inflow to an area must equal the total outflow plus the net change in storage.

NOTE — For any hydrologic system the terms are explained further in **3.27.1**, **3.27.2** and **3.27.3**.

3.27.1 Inflow — This term as implied in the hydrologic equation includes:

- a) precipitation,
- b) surface inflow,
- c) water piped or channelled into the area, and
- d) ground water inflow while considering a ground water body.

3.27.2 Outflow - This term includes:

- a) surface outflow;
- b) ground water;
- c) water piped or channelled out of the area;
- d) evaporation;
- e) transpiration; and
- f) interception, that is, precipitation intercepted by foliage and buildings and returned to the atmosphere without reaching the ground.

3.27.3 Change in Storage — This term relates to the cumulative change in storage of:

- a) ground water,
- b) soil moisture,
- c) snow cover,
- d) surface reservoir water and depression storage, and
- e) water temporarily existing on the surface of the ground as flowing water (called channel storage if in channels or detention storage if not in channels).

3.28 Hydrology — The applied science concerned with the water of the earth in all its states - their occurrences, distribution and circulation through the unending hydrologic cycle of:

- a) precipitation,
- b) consequent run off,
- c) stream flow,
- d) infiltration and storage,
- e) eventual evaporation, and
- f) reprecipitation.

It is concerned with the physical, chemical and physiological reactions of water with the rest of the earth, and its relation to the life of the earth.

3.29 Hydrometeorology — Meteorology concerned with water in the atmosphere as rain clouds, snow, hail and its effects on surface and/or subsurface flows, agriculture, etc"

3.30 Hydrometry — The measurement and analysis of the flow of water as well as the measurement of the specific gravity of water or suspensions of finely divided solids in water.

3.31 Hydrosphere — Aqueous envelope of the earth, including all oceans, lakes, streams, underground waters, ice in all its forms and the aqueous vapour in the atmosphere.

3.32 Ice Cap — Perennial cover of ice and snow over an extensive area of land or sea. (An ice cap is a glacier, a thick layer of ice and snow, that covers fewer than 50,000 square kilometers)

3.33 Influent Stream or Losing Stream — A stream or stretch of stream which contributes water to the zone of saturation. The water surface of such stream stands at a higher level than the water table or piezometric surface of the ground water body to which it contributes water.

3.34 Intermittent Stream — Stream which flows during a season.

3.35 Isobars — Lines joining points of equal atmospheric pressure.

3.36 Isotherms or Isothermal Lines — Lines joining points of equal temperatures.

3.31 Limnology — That branch of hydrology relating to inland water bodies – lakes, reservoirs ponds etc.

3.38 Meteorology — That branch of science which deals with atmospheric phenomena and the basic laws that produce and control such phenomena.

3.39 Pack Ice — A large body of floating pieces of ice moving together as a continuous cover or a rugged mass.

3.40 Perennial — Flowing during all the year, for example, perennial stream, perennial canal.

3.41 Potamology — That branch of hydrology which pertains to surface streams, the science of rivers.

3.42 Regeneration — Regeneration, as distinct from return flow, is the water which enters the river (or stream) as percolation or seepage through its bed and banks.

3.43 Return Flow — Return flow is that portion of the water diverted from a river or stream which ultimately finds its way back through surface run off (visible flow) and as percolation or seepage through the bed and banks (invisible flow).

3.44 River — A large stream for conveying water.

3.45 Semi-arid or Sub-arid — A term applied to an area or climate, neither entirely and nor strictly humid but with a pronounced tendency towards arid character in which certain types of crops can be grown without irrigation.

3.46 Semi-humid or Sub-humid — Land or climate, neither entirely arid nor strictly humid, with pronounced tendency towards humid character.

3.47 Ice Sheet — Perennial cover of ice and snow over an extensive area of land or sea (Glacial ice covering more than 50,000 square kilometers (19,000 square miles) is called an ice sheet)

3.48 Slush Ice — An unfrozen mixture of water and ice.

3.49 Stream — A natural channel for conveying water.

3.50 Torrent — A stream of water flowing with great velocity or turbulence, as during a freshet or down a steep incline.

3.51 Thermograph — An instrument designed for automatic recording of temperatures.

3.52 Water Year — Continuous twelve-month period selected for maintaining or presenting records of flow, and or use of water or any river system.

ANNEX A*(Clause 2)***LIST OF REFERRED INDIAN STANDARDS**

<i>IS No.</i>	<i>Title</i>
IS 4410 (Part 1) : 1991 (Reviewed In : 2019)	Glossary of terms relating to river valley projects: Part 1 irrigation practice (<i>first revision</i>)
IS 4410 (Part 2) : 1967 (Reviewed In : 2021)	Glossary of terms relating to river valley projects: Part 2 project planning
IS 4410 (Part 3) : 1988 (Reviewed In : 2021)	Glossary of terms relating to river valley projects: Part 3 river and river training (<i>first revision</i>)
IS 4410 (Part 4) : 1982 (Reviewed In : 2021)	Glossary of terms relating to river valley projects: Part 4 drawings (<i>first revision</i>)
IS 4410 (Part 5) : 1982 (Reviewed In : 2020)	Glossary of terms relating to river valley projects: Part v canals (<i>first revision</i>)
IS 4410 (Part 6) : 1983 (Reviewed In : 2021)	Glossary of terms relating to river valley projects: Part 6 reservoirs (<i>first revision</i>)
IS 4410 (Part 7) : 1982 (Reviewed In : 2020)	Glossary of terms relating to river valley projects: Part 7 engineering geology (<i>first revision</i>)
IS 4410 (Part 8) : 1992 (Reviewed In : 2020)	Glossary of terms relating to river valley projects: Part 8 dams and dam: Section (<i>first revision</i>)
IS 4410 (Part 9) : 1982 (Reviewed In : 2021)	Glossary of terms relating to river valley projects: Part 9 spillways and siphons (<i>first revision</i>)
IS 4410 (Part 10) : 1988 (Reviewed In : 2018)	Glossary of terms relating to river valley projects: Part 10 hydro - Electric power station including water conductor system (<i>first revision</i>)

