



Présentation on **The Dam Safety Act, 2021**

No.41 of 2021

[enacted by Parliament]

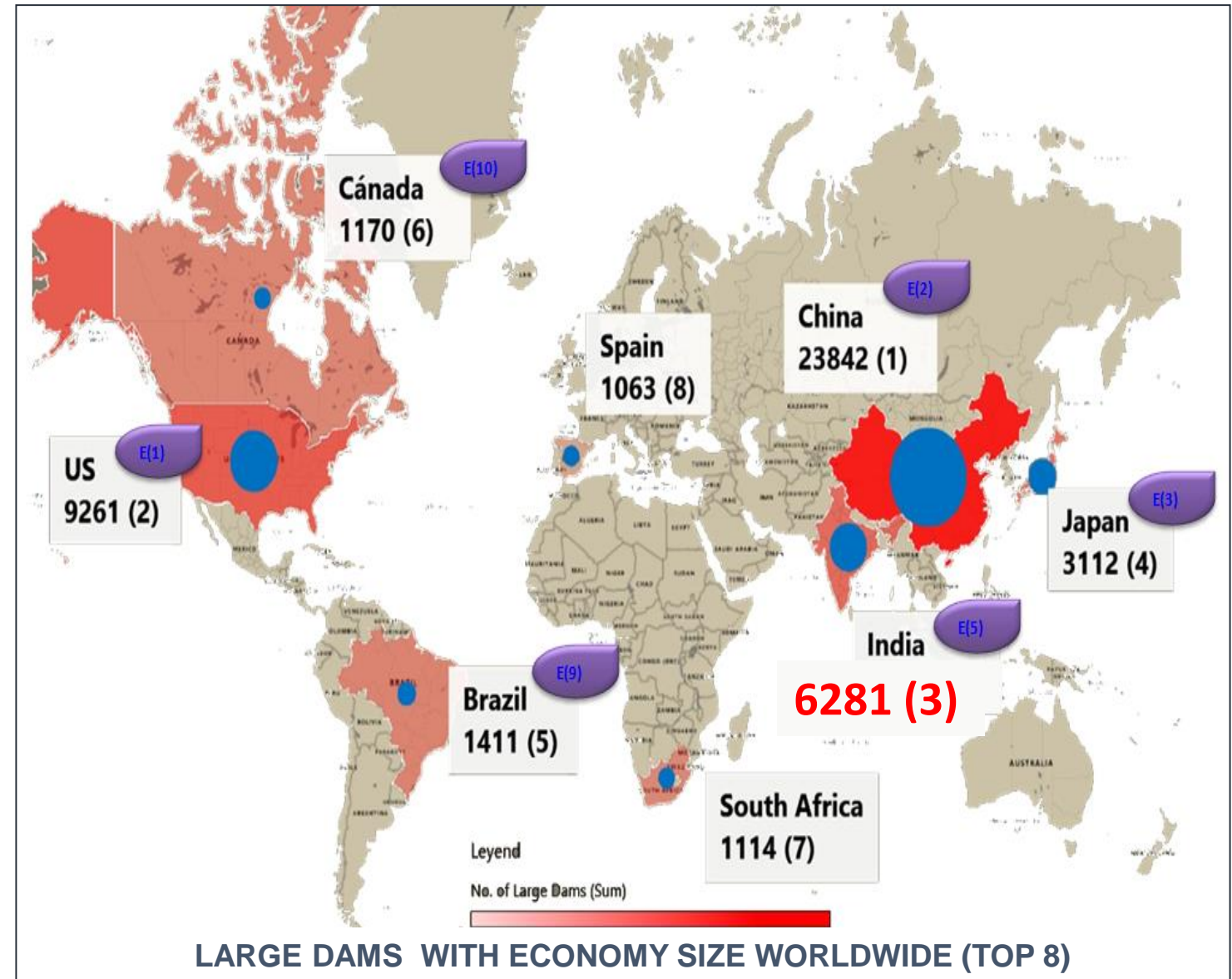
17th October, 2023
at ICED, IIT Roorkee

By

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OVERVIEW ON SAFETY OF DAMS

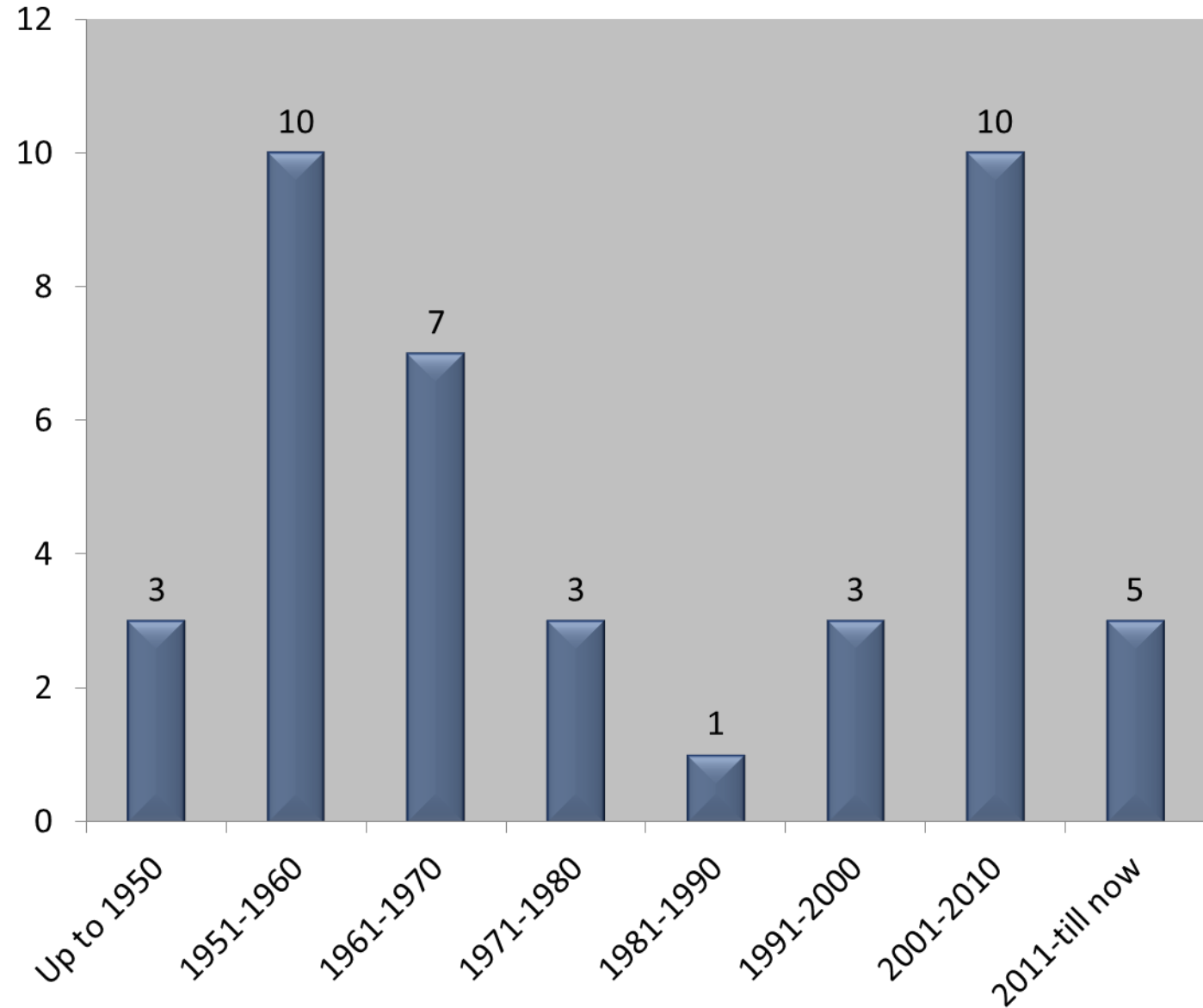
- India ranks 3rd in terms of total number of large dams after China and USA
- The existing dams have been constructed with substantial investments in terms of social and environmental costs.
- Substantial proportion of dams are getting older and subsequently, structural deficiencies and shortcomings in operation and monitoring facilities in many of ageing dams.
- New threats being posed by a changing climate to associated safety risks.
- Safety of existing dams is paramount to ensure water security and other linked services.



Dam Failures in India

- 42 numbers of dam failure have been reported till now

Decade-wise number
of dam failures in
India



National Register of Large (Specified) Dams (2023)



- The NRLD is an inventory of Large (specified) Dams in India, compiled by CWC based upon information received from Project Authority

Data as per NRLD-2023

- Total No of Large Dams In India= 6281
- Existing/Commissioned = 6138
- Under construction= 143
- Details of large dams in NRLD
Name, Type, Location, Owner, Completion year, Basin, River, Height, Length, Seismic zone, Gross Storage capacity, Reservoir area, Design spillway discharge & Purpose of project.

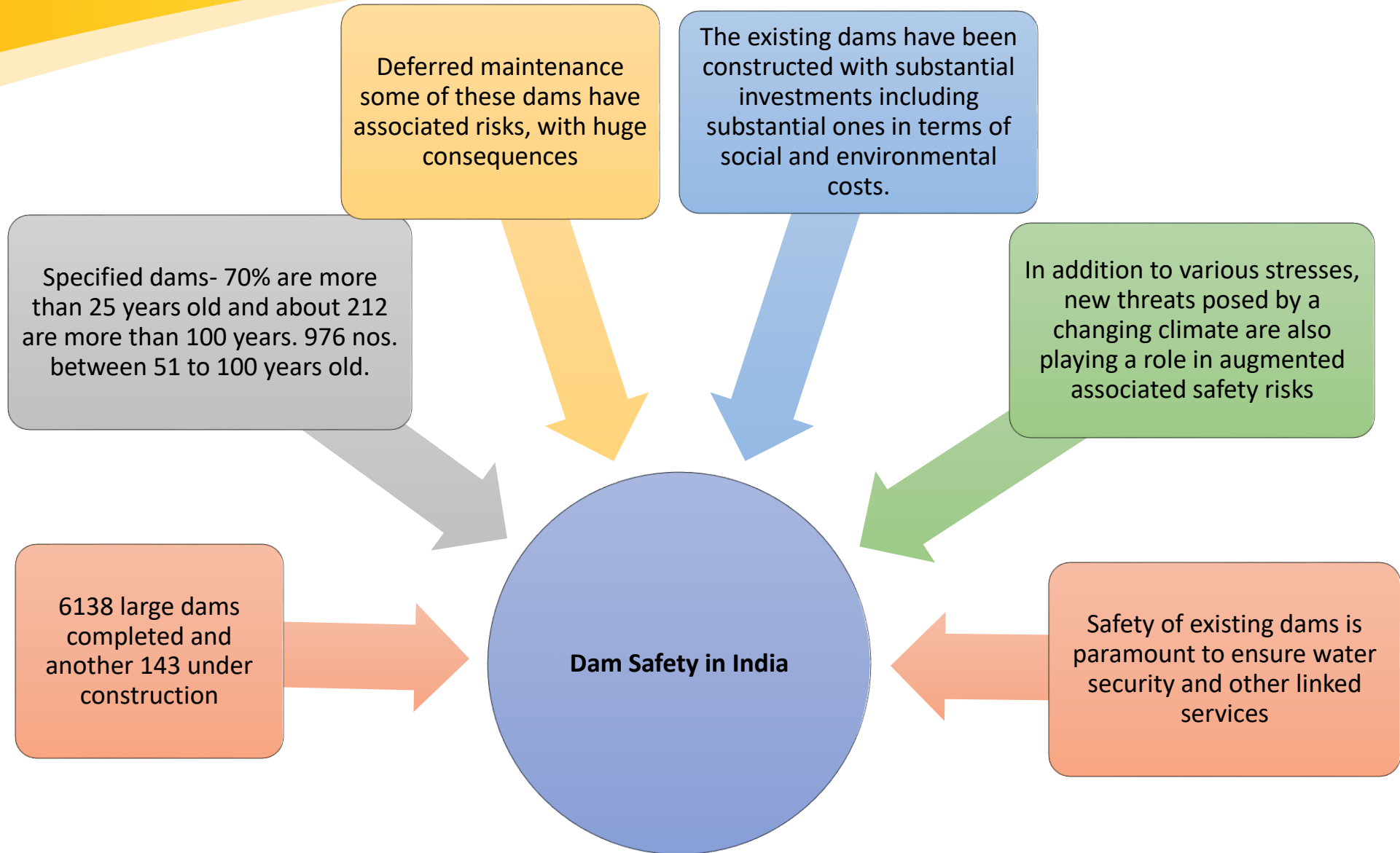
National Register of Large (specified) Dams (2023)



- A specified dam is classified as one with a maximum height of more than 15 meters from its deepest foundation to the crest.
- A dam between 10 and 15 meters in height from its deepest foundation, provided it complies with one of the following conditions :
 - a) length of crest of the dam is not less than 500 meters or
 - b) capacity of the reservoir formed by the dam is not less than one million cubic meters or
 - c) the maximum flood discharge dealt with by the dam is not less than 2000 cubic meters per second or
 - d) the dam has specially difficult foundation problems, or
 - e) the dam is of unusual design

| State/UT | No. of Large Dams (as per NRLD 2019) | |
|-------------------|--------------------------------------|--------------------|
| | Constructed | Under Construction |
| Maharashtra | 2333 | 41 |
| Madhya Pradesh | 1354 | 0 |
| Gujarat | 487 | 4 |
| Chhattisgarh | 339 | 7 |
| Karnataka | 231 | 0 |
| Rajasthan | 310 | 4 |
| Odisha | 210 | 0 |
| Telangana | 161 | 13 |
| Andhra Pradesh | 140 | 24 |
| Tamil Nadu | 127 | 0 |
| Uttar Pradesh | 151 | 4 |
| Kerala | 61 | 0 |
| Jharkhand | 55 | 24 |
| West Bengal | 36 | 0 |
| Bihar | 27 | 1 |
| Himachal Pradesh | 23 | 6 |
| Uttarakhand | 32 | 5 |
| Jammu and Kashmir | 13 | 2 |
| Punjab | 18 | 1 |
| Other States/UTs | 30 | 7 |
| Total | 6138 | 143 |

Dam Safety in India





Dam Safety ACT 2021

Preamble

*“An Act to provide for surveillance, inspection, operation and maintenance of the specified dam for **prevention of dam failure related disasters** and to provide for **institutional mechanism** to ensure their safe functioning and for matters connected therewith or incidental thereto”*

11 Chapters

56 Clauses

3 Schedules



**DAM
SAFETY
ACT,
2021**





BACKGROUND

- 1982 : A **Standing Committee** on Dam Safety constituted to review the existing practices & evolve unified procedures for dam safety
- 1986 : Report on Dam Safety Procedures, submitted by Standing Committee. One of the **recommendations** was enactment of ***Dam Safety Legislation***.
- 1987 : **National Committee on Dam Safety** established (reconstituted from time to time)
- 1988 : **Dam Safety Bill drafted in 1987 and circulated in 1988** to members of National Committee on Dam Safety (NCDS, 1987)
- Suggestions given by twelve members States (AP, Bihar, Guj, Kar, Ker, MP, Mah, Odisha, Raj, TN, UP and WB)
- **Draft Modified Bill prepared in year 2002, shared** with Principal Secretaries/Seretaries of Irrigation/Water Resources/PWD of the States.
- Bihar enacted the Dam Safety Act, 2006 in line with the Draft Bill circulated by the Ministry, published in the Bihar Gazette in May, 2006



BACKGROUND (contd...)

- AP (March 2007) and WB (July 2007), respective Legislative Assembly adopted a Resolution that Dam Safety legislation should be regulated in the State by an Act of Parliament
- 2010 : Dam Safety Bill, 2010 was introduced in Lok Sabha on 30 August 2010. Bill was referred to the **Standing Committee on Water Resources** for detailed examination and report
- 2011 : **Standing Committee** submitted the Report in June 2011
- Bill lapsed due to dissolution of 14th Lok Sabha
- 2019 : **Modified Dam Safety Bill, 2019** passed by Lok Sabha on 29th July, 2019
- 2021 : **Modified Dam Safety Bill, 2019** passed by Rajya Sabha on 2nd Dec, 2021
- 2021 : **THE DAM SAFETY, ACT 2021** enacted by Parliament got assent of the President of India on the 13th December 2021
- 2021: The Central Government appoints **30th December, 2021** as the date on which the provisions of the said Act shall come into force

Dam Safety Act, 2021

- **Dam Safety Act, 2021 received the assent of the President on the 13th December, 2021**
- **Central Government appointed the 30th December, 2021 as the date on which the provisions of the said Act shall come into force.**



to provide surveillance, inspection, operation and maintenance of the dam for prevention of dam failure related disasters



applies on dams with height more than 15 m, or height between 10 m to 15 m with certain design and structural conditions



to evolve uniform dam safety procedures across the country



to provide institutional mechanism to ensure their safe functioning and for matters connected therewith or incidental thereto.

CONTENTS



DAM SAFETY ACT, 2021

Chapters:

1. Preliminary (Clauses :1-4)
2. National Committee on Dam Safety (Clauses : 5-7)
3. National Dam Safety Authority (Clauses : 8-10)
4. State Committee on Dam Safety (Clauses : 11-13)
5. State Dam Safety Organisation (Clauses : 14-15)
6. Duties and Functions in Relation to Dam Safety (Clauses : 16-29)
7. Safety, Inspection and Data Collection (Clauses : 30-34)
8. Emergency Action Plan and Disaster Management (Clauses : 35-37)
9. Comprehensive Dam Safety Evaluation (Clauses : 38-40)
10. Offences and Penalties (Clauses : 41-44)
11. Miscellaneous (Clauses : 45-56)

The Schedules:

1. The First Schedule: Functions of National Committee on Dam Safety
2. The Second Schedule: Functions of Dam Safety Authority
3. The Third Schedule: Functions of State Committee on Dam Safety

Dam Safety Act, 2021

Uniform Dam Safety Procedures and Standard Guidelines/Manuals based on the State of the Art technologies and best global practices to be evolved and followed by the dam stakeholders.





Dam Safety Act, 2021 : Institutional Setup

Dam Safety Act, 2021 has the provisions for the constitution of national as well as state level bodies for the implementation of the Act

National Committee on Dam safety (NCDS)

- to evolve policies and recommend necessary regulations regarding dam safety standards
- Constituted and notified in the Gazette of India dated 17.2.2022

National Dam safety Organization (NDSA)

- a regulatory body to implement the policy, guidelines and standards for proper surveillance, inspection and maintenance
- Constituted and notified in the Gazette of India dated 17.2.2022
- Composition notified vide OM dated 25.04.2022

State Committee on Dam Safety (SCDS)

- supervise state dam rehabilitation programs, review the work of the SDSO, and review the progress on measures recommended in relation to dam safety
- Constituted by all States and 3 UTs

State Dam Safety Organisation (SDSO)

- to keep perpetual surveillance, carry out inspections, monitor the operation and maintenance
- Established by all States and 3 UTs



National Committee on Dam Safety

- The NCDS has come into force from 18th Feb, 2021 as per the gazette of India notification dated 17th Feb, 2021 with the following composition (**21 Members**):
- Chairperson: Chairman, CWC
- Members –ex officio (**10** Members from Central Govt- not below Jt. Secretary rank)
 1. Member (Design & Research), CWC
 2. Member(Hydro), CEA
 3. Chairman, NDSA
 4. Representative from DoWR, RD&GR, Ministry of Jal Shakti
 5. Representative from NDMA,MHA
 6. Representative from MoEF & Climate Change
 7. Director General, IMD, Ministry of Earth sciences
 8. Director General, GSI, Ministry of Mines
 9. Director, NGRI, Ministry of Science & Technology
 10. Director, NRSC, Indian Space Research Org., Deptt of Space
 11. **7** representatives of the State Government of the level of Engineer-in-chief or equivalent by rotation as per the Members
 - 12.**Three** specialists in the field of dam safety and allied fields
 - 13.Member (Policy & Research wing) of NDSA shall be the secretary of the NCDS

National Committee on Dam Safety



- Vide OM dated 06.04.2022, following states and specialists have been nominated as members of NCDS for a period of 3 years:
- States -
 1. Andhra Pradesh
 2. Himachal Pradesh
 3. Arunachal Pradesh
 4. Manipur
 5. Bihar
 6. Gujarat
 7. Rajasthan
- Specialists –
 1. Sh. D K Sharma, Chairman, Himachal Pradesh Electricity Regulatory Commission.
 2. Prof. C V R Murty, P S Rao Institute Chair Professor, Department of Civil Engineering, IIT Madras



National Committee on Dam Safety

Broad functions of the Committee :

- Act as a forum for exchange of views
- Formulation of policies and regulations for dam safety
- Evolve comprehensive dam safety management approach
- Render advice on matters relating to dam safety
- Analyzing causes of dam failures; improvement in dam safety practices
- Recommendations on rehabilitation requirements of ageing dams
- Safety measures for dams located outside India also
- Supervision of dam rehabilitation program
- Identify areas of R&D in dam safety
- Make recommendation on the coordinated reservoir operations

(Detailed Functions of NCDS are given in Schedule I of DSA, 2021)

National Dam Safety Authority



STRUCTURE

1. Head of the Authority: **Chairperson**
2. Chairperson shall be assisted by **five** Advisors, each heading one of the following wings of the Authority:
 - i. Policy and Research Wing
 - ii. Technical Wing
 - iii. Regulation Wing
 - iv. Disaster & Resilience Wing
 - v. Administration & Finance Wing
3. Regional Offices: For liaison & coordination services with States, four number of Regional offices shall be established.
 - i. Northern Region
 - ii. East & Northern Region
 - iii. Western Region
 - iv. Southern Region



National Dam Safety Authority

Important Functions of the Authority:

- Implement the policies formulated by the NCDS
- Resolve issues between State Dam Safety Organizations (SDSOs), or between a SDSO and any dam owner in that state,
- Specify regulations for inspection and investigation of dams
- Accreditation of design & construction agencies
- Preparation of Annual Report of the dam safety activities in the country to be laid before each House of Parliament; share with NDMA & Public
- The Authority shall be construed as the SDSO where a specified dam is owned by a CPSU or where a specified dam is extended over two or more states, or where the specified dam in one State is owned by another State.
- For dams located outside India, NDSA shall inform the Central Government to take all suitable measures to mitigate the threat to residents of India.

Every decision of the AUTHORITY taken in respect of matters under this Act, shall be binding upon all the parties to the issue.

(Detailed Functions of NDSA are given in Schedule II of DSA, 2021)



National Dam Safety Authority

FUNCTIONS OF WINGS:

- **Policy and Research Wing**

Secretariat of the 'NCDS and its sub-committees; formulation/revision of various guidelines, manuals, checklists, Research & Development, Public awareness and dissemination, vulnerability and hazard classification of dams etc.

- **Technical Wing**

All technical matters, directions on manpower, activities related to experts, matters related to experience and qualification of dam safety official, accreditation of agencies for investigation, design, construction, quality control etc.

- **Regulation Wing**

Dam safety regulations, maintenance of log-books, instrumentation, hydro-meteorological stations, seismological stations, risk assessment studies, comprehensive dam safety evaluation etc. parliament matters.

- **Disaster & Resilience Wing**

Resolution of conflicts between States/ dam owners, technical & managerial assistance to States/dam owners; investigation of dam failures and other public safety concerns, emergency action plan, preparation of annual report; and supervision of Regional Offices of NDSA

The Authority shall be construed as the SDSO where a specified dam is owned by a Central Public Sector Undertaking or where a specified dam is extended over two or more states, or where the specified dam in one State is owned by another State.

- **Administration & Finance Wing**

All activities related to service matter of human resources, finance, vigilance, legal, Information Technology as well as any matter referred to it by the Central Government.

National Dam Safety Authority

- Govt of India has notified the establishment of the National Dam Safety Authority (NDSA) on 17 Feb 2022.
- As per OM dated 25.04.2022, CWC has been given the following broad structure of NDSA on Additional Charge basis so as to make it functional on temporary basis till such time the RRs are finalized.

| | | |
|---|---------------------------------|--|
| 1 | Chairman, NDSA | Member (D&R), CWC |
| 2 | Member- Policy & Research | Chief Engineer, Dam Safety Organization, CWC |
| 3 | Member- Technical | Chief Engineer, Designs (N&W), CWC |
| 4 | Member- Regulation | Chief Engineer, Designs (E&NE), CWC |
| 5 | Member- Disaster & Resilience | Chief Engineer, Designs (NW&S), CWC |
| 6 | Member-Administration & Finance | Joint Secretary & Financial Advisor, DoWR, RD & GR |

National Dam Safety Authority



- The details of CWC field offices/officers who have been assigned the additional charge of four regional offices of NDSA are as per the following-

| S. No. | Regional Office | Name of States/UTs under their jurisdiction | Proposed CWC officers |
|--------|--------------------------|---|--|
| 1 | Northern Region | Jammu & Kashmir, Ladakh, Chandigarh, Delhi, Uttar Pradesh, Punjab, Haryana, Uttarakhand and Himachal Pradesh. | SE(C) IBO, Block 4, 6 th Floor, Kendriya Sadan, Sector 9A Chandigarh |
| 2 | East & North East Region | Bihar, Jharkhand, West Bengal, Chhattisgarh, Odisha, Sikkim, Assam, Meghalaya, Arunachal Pradesh, Nagaland, Manipur, Mizoram and Tripura. | Director (M&A), CWC Complex, 2 nd Floor, P O Guwahati University, Guwahati |
| 3 | Western Region | Rajasthan, Gujarat, Madhya Pradesh, Maharashtra, Dadara and Nagar Haveli and Daman & Diu, Goa. | Director (M&A), Monitoring Central Organisation, NWA, Sinhagad Road, Khadakwasla, Pune |
| 4 | Southern Region | Telangana, Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Puducherry, Lakshadweep and Andaman & Nicobar Island. | Director (Mon) Cauvery & Southern Rivers Organisation, Neervalam, R-81, TNHB Colony, West Velacherry, Chennai |

State Committee on Dam Safety

- **SCDS to be established by State Govt. within 180 days**
- **All States & 3 UTs have established SCDS**

Broad Functions:

[Detailed Functions of SCDS are given in Schedule III of DSA, 2021]

- Review the works of the SDSO
- Dam safety investigations for dams under distress condition
- Recommend dam safety measures for dams under distress
- Prioritize the projects for remedial works
- Progress review of dam safety measures recommended
- Assess the potential impact/ implication on U/S or D/s State due to reservoir filling or failure of dam
- Assess probability of cascading dam failures and suggest mitigation measures
- Supervision of state funded dam rehabilitation programs
- Any other dam safety matter referred by State Govt



State Dam Safety Organization

- **SDSO to be established by State Govt. within 180 days**
- **All States & 3 UTs have established SDSO**

Broad Functions:

- Surveillance, Inspection and monitor the O & M works of dams to ensure safety of dams
- Investigations, review & study various design features
- vulnerability and hazard classification of the dams as per regulations
- **Maintenance log books**, Record of dam failures and dam incidents & report to the Authority
- **Maintain record of dam failures and dam incidents & report to the Authority**
- Render instructions to the owner of the dam on safety measures as a result of comprehensive dam safety study
- **Prepare annual report** to be laid before each house of the State Legislature by State Govt & forward to NDMA/ Public domain

Dam Owners

- **98% of Large Dams are owned by State Govt / CPSUs/Boards; and 2% by other Agencies**

Important Duties and Functions



- Comprehensive dam safety evaluation in 5 years
- Emergency Action Plan (EAP) within 5 years
- Risk assessment studies under EAP
- Establish network of hydro-meteorological stations; & inflow forecasting system
- Monitor the performance of dam; install instruments; early warning system
- Establish Seismological stations
- Create Dam Safety Unit
- Carry out a pre & post monsoon inspection
- Compile technical/ engineering data
- Ensure that O&M Manual is strictly followed
- Extend assistance to any authority to mitigate any disaster or emergency
- Provide funds for maintenance & Repairs



Miscellaneous

- For dams located outside India, the Central Government shall take all suitable measures to mitigate any possible threat to the life and property of people located in India.
- The Central Govt may, by notification, amend the Schedules, and will lay a copy of such notification before each House of Parliament.
- The Central Govt may give necessary directions to the owner of the dam for effective implementation of the provisions of the Act, 2021
- The Central Govt may, by notification may make rules to carry out the provisions of the Act, 2021.
- The Central Govt may make such provisions to remove the difficulty, if any, in implementing the provisions of this Act.
- Every Rule & Regulation made by Central Govt under this Act shall be laid before each house of Parliament

Offences and Penalties



Provisions have been made for punishment for obstructions for

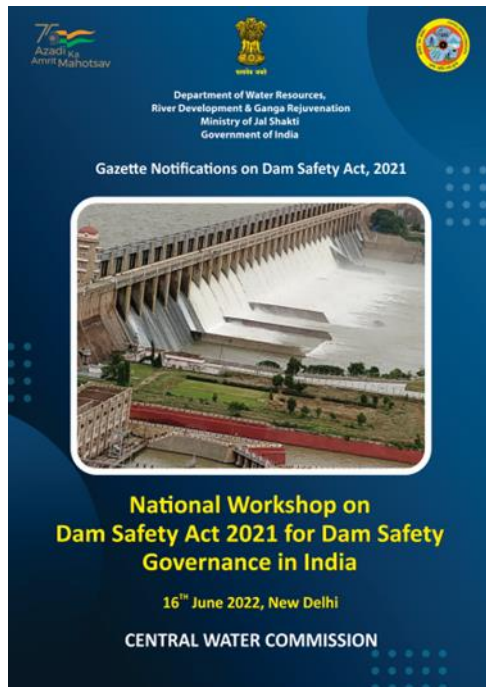
whoever without reasonable cause-

- a) obstructs any officer or employee of Central /State Govt or a person authorized by NCDS or NDSA or SCDS or SDSO in discharge of his functions under this Act; or
- b) refuses to comply with any direction given by or on behalf of Central Government or the State Government or National Committee or the Authority or the State Committee or the State Dam Safety Organization under this Act.

DSA, 2021-Progress so far



National Workshop on DSA, 2021 held on 16.6.2021 in New Delhi



- The Dam Safety Act, 2021 No.41 OF 2021 :Gazette Notification dated 14.12, 2021: Ministry of Law and Justice
- The effective date of Dam Safety Act, 2021: Gazette Notification dt 28.12.2021: MoJS, Notification-S.O. 5422(E)
- Constitution of the NCDS: MoJS Notification-S.O. 757(E) in Gazette of India; dt 17.2.2022
- NCDS(Procedures, Allowance and other Expenditure) Rules, 2022; MoJS Notification-G.S.R. 134(E) in Gazette of India dated 17.2. 2022
- Establishment of NDSA: MoJS Notification S.O. 758(E) in Gazette of India; dt 17.2.2022
- NDSA(Functions and Powers) Rules, 2022: MoJS Notification- G.S.R. 135(E) in Gazette of India; dt 17.2.2022
- NCDS & NDSA functional on additional charge basis
- SCDS & SDSO formed by all States
- 4 Regional Workshops held so far
- Draft of 7 out of 19 Regulations as per section 54 of Act prepared

Progress Contd./

Tackling Institutional setup

Institutional Strengthening

- Institutional setup has been strengthened for a sustainable dam safety culture under DRIP, which got a further fillip after the passage of the Dam Safety Act.
- All the States now have SCDS and SDSO.
- States/ dam owners are being encouraged to have dedicated funds for the purpose of Dam Safety, which has become obligatory on the part of dam owners after the passage of the Dam Safety Act, 2021.



Progress Contd./

Non-structural issues

Emergency Action Plan (EAP), Operation & Maintenance (O&M) Manual, Instrumentation and Regular Monitoring of Dams

- For establishing uniform protocols/procedures for dam safety, such as EAP and O&M, etc., CWC has issued 13 guidelines under DRIP.
- NDSA is in the process of issuing regulations/guidelines for uniform protocol/ procedures for ensuring dam safety however, till then, CWC guidelines are to be used.

Guidelines Published



Guidelines for Developing Emergency Action Plans for Dams (February 2016)

Manual for Rehabilitation of Large Dams (January 2018)

Guidelines for Instrumentation of Large Dams (January 2018)

Guidelines for Preparing Operations and Maintenance Manuals for Dams (January 2018)

Guidelines for Mapping Flood Risks Associated with Dams (January 2018)

Guidelines for Safety Inspections of Dams (January 2018)

Guidelines for Assessing and Managing Reservoir Sedimentation (February 2019)

Guidelines for Assessing and Managing Risks Associated with Dams (February 2019)

Guidelines for Operation Procedures for Assessing and Managing Environmental Impacts in Existing Dam Projects (November 2020)

Guidelines for Classifying the Hazard Potential of Dams (November 2020)

Manual for Assessing Structural Safety of Existing Dams (November 2020)

Manual for Assessing the Hydraulic Safety of Dams (June 2021)

Guidelines for Selecting and Accommodating Inflow Design Floods for Dams (June 2021)

Dam Safety Act, 2021-Paradigm Shift



- Changing the State Govt. perception of dam safety.
- Regular meetings of NCDS & NDSA for Dam Safety awareness at the Pan India level.
- Formulation of Uniform Regulations by NDSA to be implemented at Pan India level.
- Pre/Post-Monsoon inspections of almost 100% specified dams, i.e. from about 1200 inspections annually before the Act to about 12000 inspections annually after the Act.
- Categorization of dams based on pre and post-monsoon inspections and accordingly planning the prioritised remedial measures for dams at risk.
- Introduction of M.Tech. Course on Dam Safety at IIT-Roorkee & IISc, Bangalore.
- Capacity building of organisations like CWPRS, CSMRS, NWA, etc.
- NDSA has brought a pool of experts to one platform by empaneling Dam Safety Experts.
- Capacity building of dam owners through regular training programs at NWA
- Establishment of International Centre of Excellence for Dams at IIT-R & IISc.
- Establishment of National Centre for Earthquake safety of Dams at MNIT, Jaipur

Conclusion & Way forward



Dam Safety is important to India for protecting the precious assets created and providing safety to the population settled downstream.



The enactment of DSA 2021 has made Dam Safety mandatory on the part of all stakeholders.



Capacity building of all stakeholders is necessary for implementation of provisions of the Act.



Strengthening of Institutional Mechanism is essential for implementation of the Act.



Availability of adequate funds to undertake proper operation and maintenance and also carry out rehabilitation to ensure dam safety.



Collaboration with the States in creating the Eco-system in the country on Dam Safety aspects.



International collaborations with expert agencies specially in advanced areas of dam safety such as Risk Assessment and Comprehensive Dam Safety Review etc.



THANK YOU

SAFE DAMS FOR A BETTER FUTURE

Presentation by:
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