

The use of indigenous knowledge and technology for earthquake safety promotion by the Civil Society Organization (CSO)

Presented by

Prof(Ret) Dr. Jiba Raj Pokharel

Nepal Center for Disaster Management

INDIGENOUS KNOWLEDGE

- Yokohama Strategy
 - Aim at the application of traditional knowledge, practices and values of local communities for disaster reduction
- Hyogo Framework of Action
 - The information should incorporate relevant traditional and indigenous knowledge
- Sendai Framework
 - Ensure the use of traditional, indigenous and local knowledge and practices, as appropriate, to complement scientific knowledge in disaster risk assessment
- IK refers to
 - Rural people's knowledge
 - Peasants' knowledge
 - Folk knowledge
 - Indigenous technical knowledge
 - Ethno science
 - Traditional environmental knowledge
 - Indigenous agricultural knowledge
 - Traditional knowledge

EARTHQUAKE: Houses of Jumla



INDIGENOUS KNOWLEDGE

- Take the indigenous knowledge at the point of departure
- Subject it to scientific analysis
 - IK is scientific in general
 - “Local knowledge is knowledge that is in conformity with general scientific principles, but which, because it embodies place-specific experience, allows better assessment of risk factors in production decision. This kind of knowledge arises when local people undertake their own experimentation, or where they are able to draw inferences from experiences and natural experiments.” (Richards,1994)
- Use it if found to be appropriate

CYRUS TOMB OF 550 BC

(Source: A Baryatkar et al, 2012)

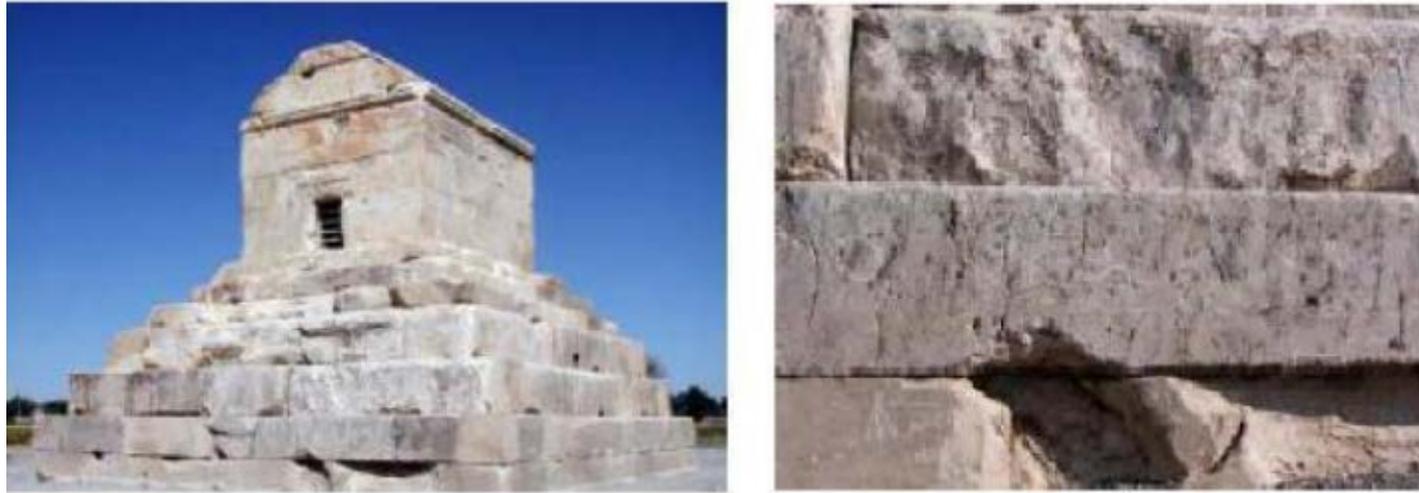


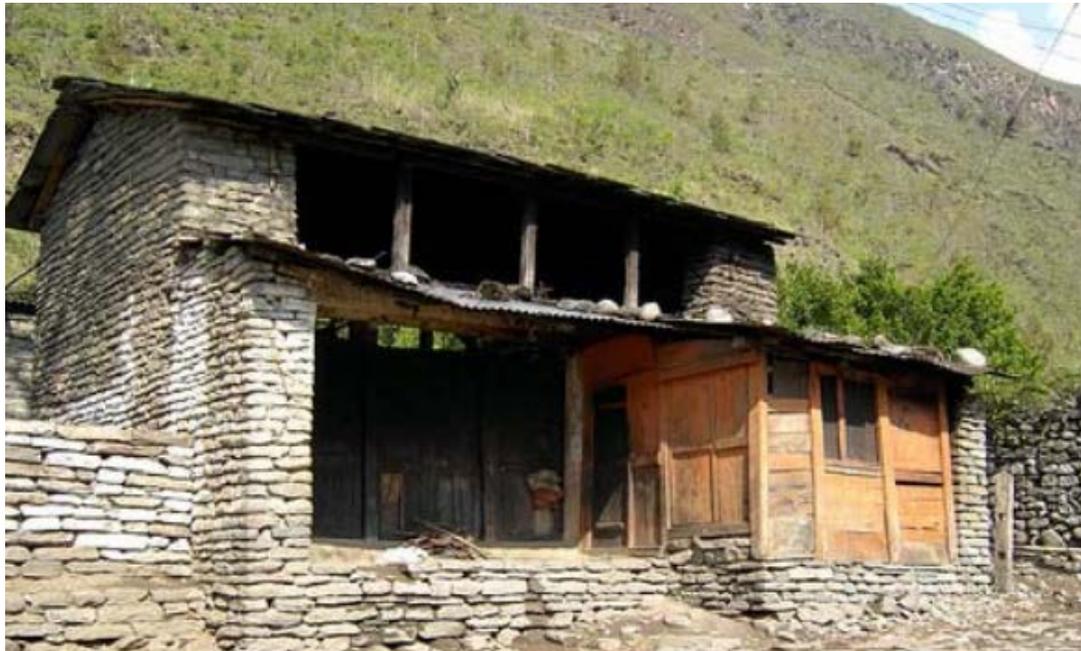
Figure 3. King Cyrus Tomb in Pasargadae (southwest of Iran) built in 550 BC. On the right, a close view of the smoothed cut-stone layers with no mortar between them can be seen.

PATAN DURBAR SQUARE: BHAI DEVAL (1668) and BHIMSHEN TEMPLE(1680)



DAMPING OF OPEN STONE JOINT

(Source: Parajuli Hari et al)



Model 1

Dry joint stones laid one over other

Element size :0.30mx0.30mx0.065m

DAMPING OF OPEN STONE JOINT

(Source: Parajuli Harriet al)

Damping estimate for dry joint stones

Estimate	1	2	3	4	5	Avg.
1	52.16	56.23	56.29	54.75	54.3	54.5
2	46.12	46.06	48.29	46.23	46.63	46.8
Average equivalent viscous damping (%)						51.0

EARTHQUAKE

- Nepal is suffering heavily through earthquake in several occasions
- The first recorded earthquake is of the year 1223
- The losses due to earthquake
 - 8891 Deaths in 2015 (NDR,2015)
 - 873 Deaths from 1971-2007 (GAR, 2009)



EARTHQUAKE

- A damping technology is being initiated
- Absorption of energy occurs due to imperfect elastic property of the medium



EARTHQUAKE DAMPING



EARTHQUAKE DAMPING



EARTHQUAKE DAMPING



Accelerometer Reading and Earthquake Damping at NAST Station, Khumaltar, Lalitpur											
S.N.	Date and Time	Epicenter and Magnitude in R.S.	KHU 1		Vector Sum (x & y)	NST2		Vector Sum (x & y)	Individual Damping in %	Vector Sum Damping in %	Remarks
			Axis	g		Axis	g				
1	2015 June 11, 16:22;27	Sindhupalchowk, 5.3	X	0.00223	0.002641752	x	0.00109	0.001560669	-51.12	-40.92	(-- 1+(0.00156/ 0.0026)* 100
			Y	0.00141		y	0.00112		-20.92		
			Z	0.00221		z	0.00112		-49.21		
2	2015 June 13, 16:22;27	Dolakha , 5.2	X	0.00202	0.002371675	x	0.00103	0.001233378	-49.21	-48.00	
			Y	0.00125		y	0.00069		-44.94		
			Z	0.0012		z	0.00067		-44.49		
3	2015 June 25, 15:22;25	Nuwakot/Dhading border, 4.3	X	0.00295	0.003553694	x	0.00152	0.002164551	-48.66	-39.09	
			Y	0.00198		y	0.00155		-21.85		
			Z	0.00159		z	0.00066		-58.54		
4	2015 June 29, 07:37;35	Kathmandu , 3.3	X	0.00501	0.005733988	x	0.00152	0.002283836	-69.76	-60.17	
			Y	0.00279		y	0.00171		-38.72		
			Z	0.00445		z	0.00099		-77.71		
5	2015 July 16, 13:51;09	Dolakha , 2.8	X	0.00279	0.004523636	x	0.001268	0.002224566	-54.56	-50.82	
			Y	0.00356		y	0.001828		-48.66		
			Z	0.00026		z	0.000109		-58.54		
6	2015 July 16, 14:22;20	Kirtipur , 3.2	X	0.00107	0.00159921	x	0.000442	0.000699162	-58.54	-56.28	
			Y	0.00119		y	0.000542		-54.56		
			Z	0.00118		z	0.000607		-48.66		
7	2015 July 16, 22:21;33	Dhading, 3.0	X	0.00084	0.001469211	x	0.000432	0.00079602	-48.66	-45.82	
			Y	0.0012		y	0.000668		-44.48		
			Z	0.00052		z	0.000467		-9.73		
8	2015 July 17, 09:06;29	Kavre, 3.9	X	0.00127	0.001496305	x	0.000578	0.000783051	-54.56	-47.67	
			Y	0.00079		y	0.000528		-32.96		
			z	0.00073		z	0.000375		-48.66		
9	2015 July 17, 13:48;34	2.7 , Dolakha	x	0.00135	0.001741214	x	0.000561	0.001023835	-58.54	-41.20	
			y	0.0011		y	0.000857		-21.85		
			z	0.00171		z	0.000680		-60.11		
AVERAGE DAMPING			x	0.00135	0.001741214	x	0.000561	0.001023835	-54.85	-47.77	
			y	0.0011		y	0.000857		-36.55		
			z	0.00171		z	0.000680		-54.69		





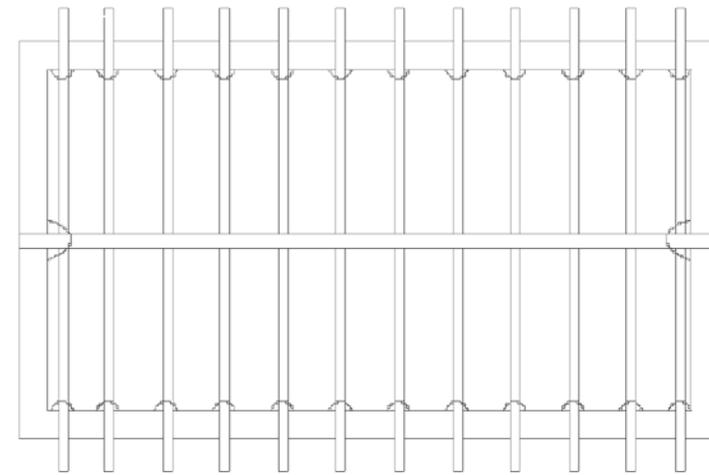
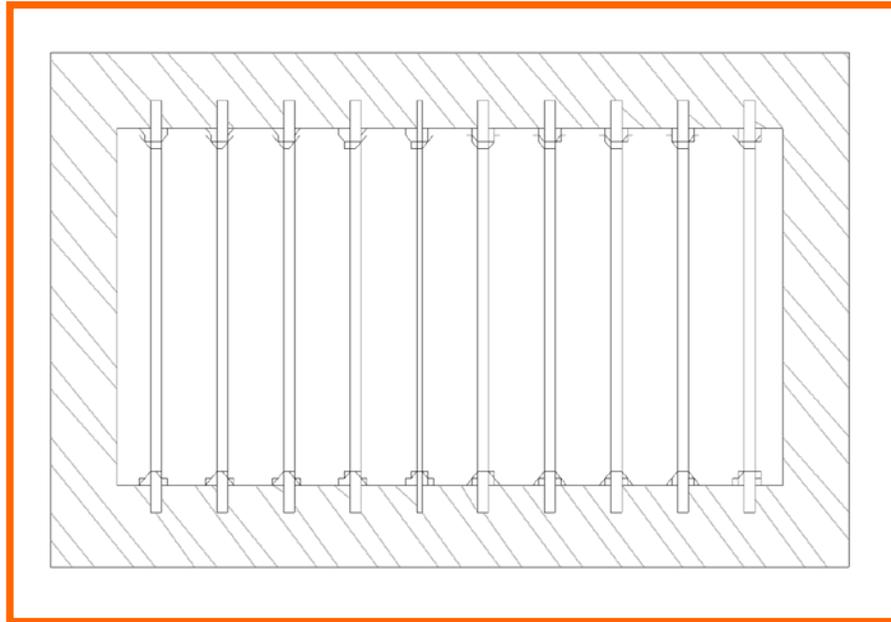
TYPICAL HILLY SETTLEMENTS



BAMBOO AND WIRE RETROFITTING



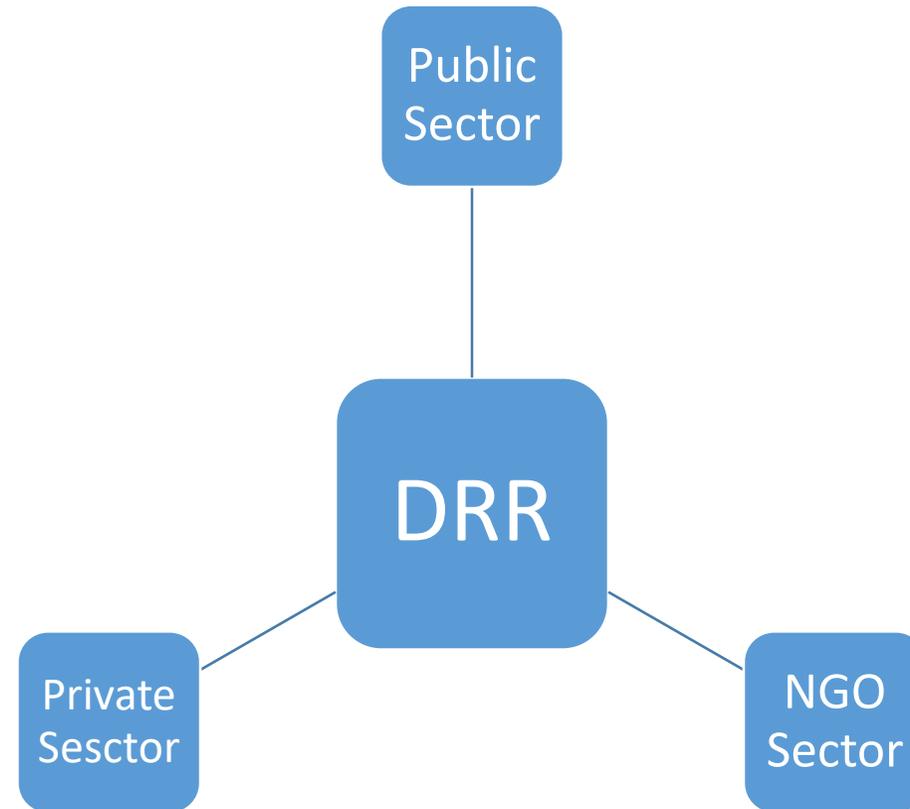
BAMBOO AND WIRE RETROFITTING



DRR TRINITY

- DRR TRIUMVIRATE
 - Government
 - Private Sector
 - Civil Societies
- Civil society “constitutes a third sector, existing alongside and interacting with the state and profit-seeking firms” (UNDP, 2001)
- NGOs/CSOs as entities that coexist “in between” state and market
- Civil society actors vary from NGOs, volunteers, and religious organizations to (organized or unorganized)
- non-governmental individuals,
- grassroots communities, and so on

Public Sector, Private Sector and NGO



CSOs in the world and Nepal

- INGOs have increased from 400 in 1900 to 25000 at the present
- The proliferation of NGOs in both developed and developing countries has impacted disaster management arrangement at different scales and levels (Tierney, 2012).
- NGOs in Nepal are 6499 registered to NGO Federation of Nepal
- NGOs often take inclusive and consensual approaches to local disaster planning and resilience building (Maskrey, 1989; Lassa, 2018).
- Their relatively small organizational size allows them to be prompt and efficient, as they operate in a more flexible and less bureaucratic environment (UNISDR, 2006)

ACTIVITIES OF I/NGOs

- NGOs as First Responders
 - Provide assessment reports
- NGOs as DRR Policy Drafters and Queasy Parliamentarians
 - First Oxfam helped NCDM to draft the policy and DRR Law in Nepal
- Linking Modern Knowledge With Indigenous Knowledge
 - Mercy Corps and recently DCA
- Agenda for Gender Justice in DRR
 - Oxfam, Care International, Action Aid, World Vision, Mercy Corps
- Inclusive Disaster Risk Reduction: Aging Population
 - HelpAge

ACTIVITIES OF I/NGOs

- NGOs as First Responders
 - Provide assessment reports
- NGOs as DRR Policy Drafters and Queasy Parliamentarians
 - Oxfam helped to draft the policy and DRR Law
- Promotion of Community-Based Disaster Risk Reduction
 - Oxfam have been pioneers and trend-setters in the earlier formation of CBDRR frameworks (Maskrey, 1989; Von Kotze & Holloway, 1996)
- Promotion of Participation by Children
 - NGOs such as Plan International, Save the Children, World Vision, and Child Fund, among others, have been promoting the need to include children

SENDAI GLOBAL TARGET

- (a) substantially reduce global disaster mortality by 2030,
 - aiming to lower the average per 100,000 global mortality rate in the decade 2020–2030 compared to the period 2005–2015;
- (b) substantially reduce the number of affected people globally by 2030,
 - aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015 (UNISDR, 2015).

NGOs' Evolution From Humanitarian to Disaster Risk Reduction

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
	1945–1970	1971–1989	1990–2005	2005–2015	Post 2015
DRR regimes	Relief/basics	Pre-UNDRO	UNDRO IDNDR and Yokohama Framework	HFA framework	Post HFA Framework DRR with Sustainability Visions
NGO approach	Altruism/humanitarianism	Community development	Advocacy	Mixed approaches	Complexity, collaborative
Focus	Local/specific	Local/specific	Regional/National	National/Global	Ecosystem/ balanced system
Time frame	Immediate	Project life	10–20 years	Open-ended	Variable
Scope	Individual	Neighborhood	Region/nation)	Nation	Ecosystem (natural/ constructed
Participants	NGO members	NGO/communities	“everyone”	networks	Super networks
NGO role	Primary/central	Mobilize/direct	Catalyze/innovate	Active/direct involved	Educational/tech support

References

- A. Bayraktar, H. Keypour, A. Naderzadeh, 2012, **Application of Ancient Earthquake Resistant Method in Modern Construction Technology**, 15 WCEE, LISBOA
- Hari Parajuli, Ph. D. Student, Kyoto University, Junji Kiyono, Associate Professor, Kyoto University, Yusuke Ono, Assistant Professor, Kyoto University, **Experimental investigation of damping for stone masonry**, NAEJC Workshop
- Jonatan A. Lassa, 2018, **Roles of Non-Government Organizations in Disaster Risk Reduction**, Oxford Research Encyclopedia of Natural Hazard Science

THANKS

Thanks to Mukunda Bhattarai, Department of
Mines

Any queries?