

# The Cultural Heritage **Risk** Map – Israel

ACRE, 17 December 2012

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[http://www.iaa-conservation.org.il/index\\_eng.asp](http://www.iaa-conservation.org.il/index_eng.asp)

Israel Risk Map

ISRAEL  
ANTIQUITIES  
AUTHORITY



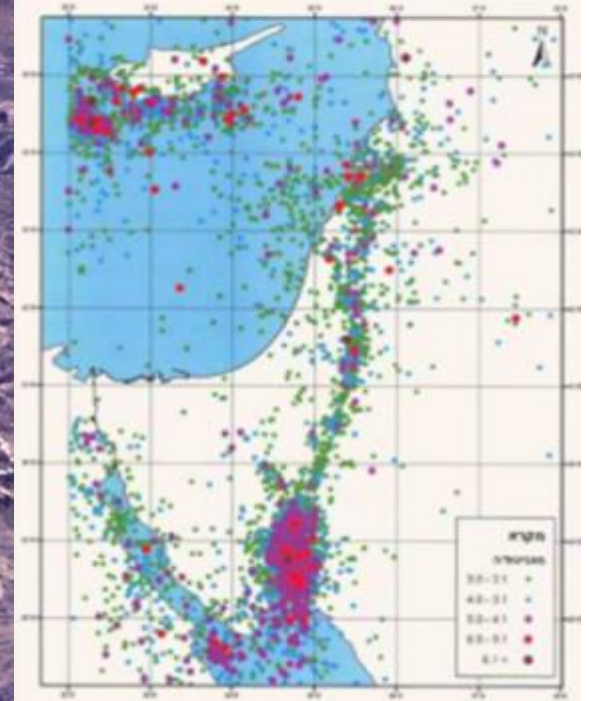
רשות  
העתיקות



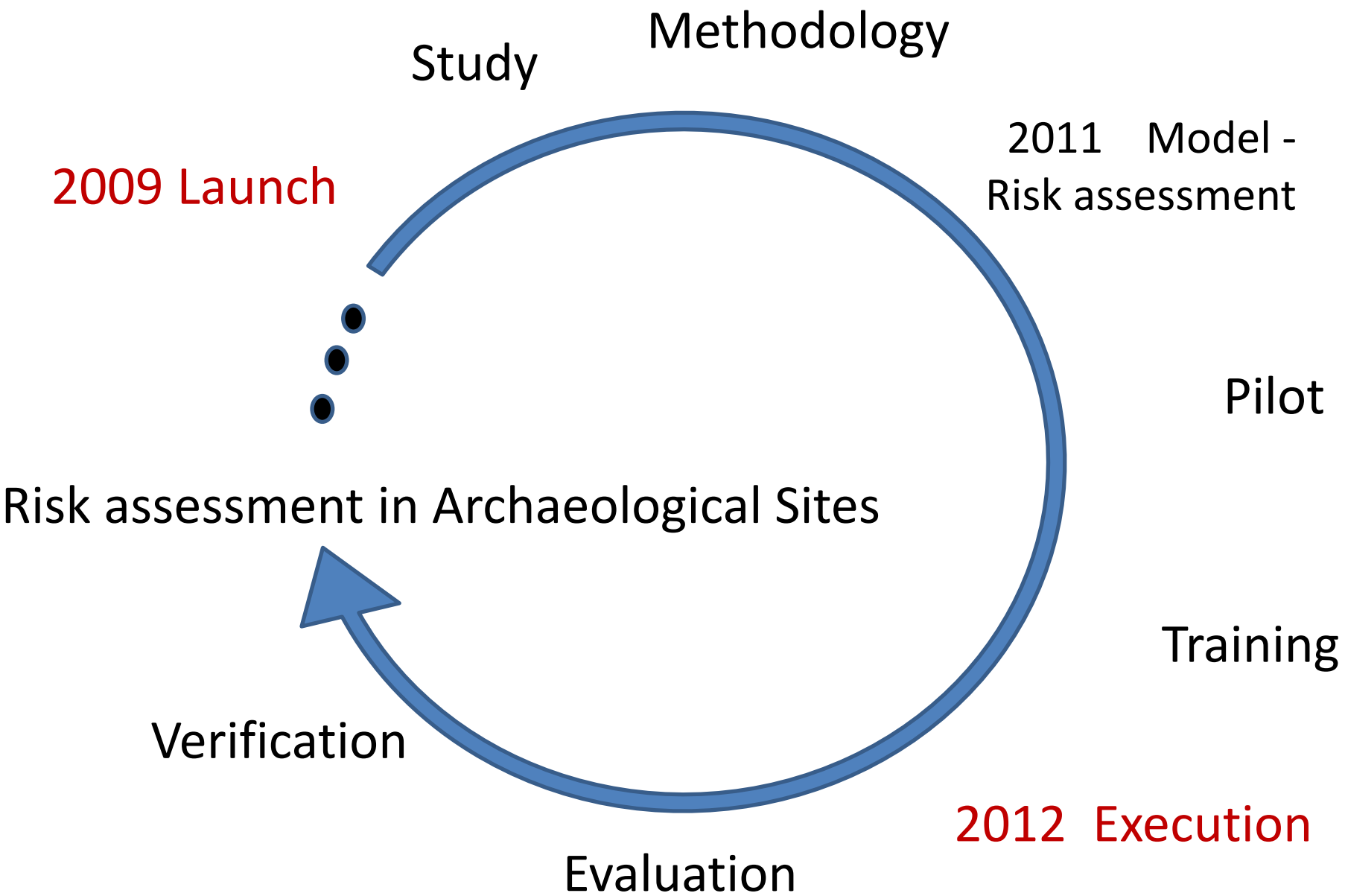
# Risk map objectives

- State of art
- Management tool based on knowledge
- Possible priorities for action
- Coordination
- A tool to raise the awareness
- Guidelines for risk preparedness

Seismic events since 1900





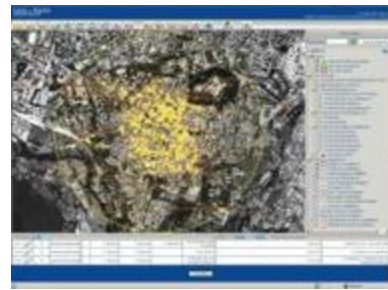
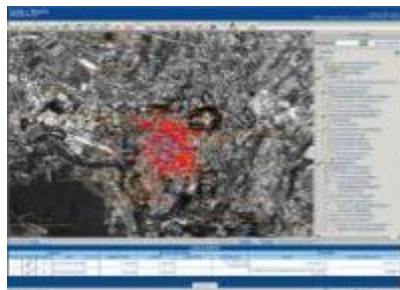




# Second UNESCO World Heritage workshop on 'Disaster Risk Reduction to Cultural Heritage'

14-17 November 2009, Acre, Israel





## PRINCIPLES for our RISK MAP

SIMPLE - simplified model, open to upgrade

SUPPORT - by external expertise ( Padova Uni. Italy, Niker project)

KNOWN CRITERIA - existing parameters

WIDESPREAD - collaboration with all key players

SUSTAINABLE - based on internal sources / capacities

# Parameters for Selected Sites.

## Height

## Value/important

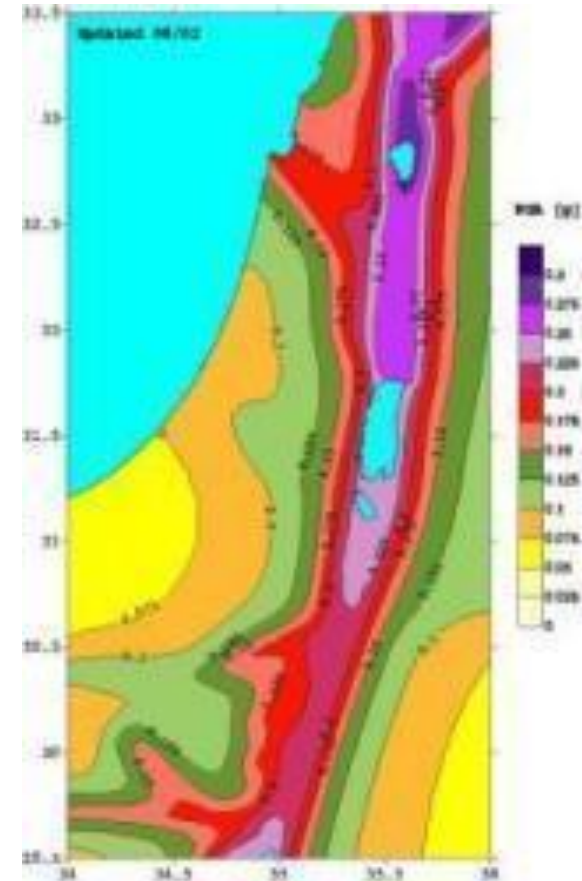
## Seismic danger



>4m

<4m

<2m



# Final results of sites evaluation according the 3 parameters: Location, Value/important, Height

Score	Seismic Location	Value	Height	NY	NX	SY	SX	NAME	שם	תת אתר	ATA_ID	Site No
12	4	5	3	582000	235000	579000	233000	Masada (3201/0)	חרבות מצדה (3201/0)	0	3201	3201/0
12	4	5	3	770200	254200	768650	252500	Hazor, T. (3757/0)	חצור, תל (3757/0)	0	3757	3757/0
11	3	5	3	760400	208900	758000	206400	Acre (2266/0)	עכו (2266/0)	0	2266	2266/0
11	3	5	3	722000	218000	721000	217000	Megiddo, T. (2723/0)	מגידו, תל (2723/0)	0	2723	2723/0
11	4	4	3	714000	241000	713000	240000	Bet Alfa (3338/0)	בית אלפא (3338/0)	0	3338	3338/0
11	4	4	3	747000	245900	746500	245200	Arbel, H. (3482/0)	ארבל, ח' (3482/0)	0	3482	3482/0
11	4	4	3	713000	249000	711000	246000	Bet She'an (3537/0)	בית שאן (3537/0)	0	3537	3537/0
11	4	4	3	723000	250000	722000	249000	Belvoir (3612/0)	כוכב הירדן (3612/0)	0	3612	3612/0
11	4	4	3	795300	265600	794000	263300	Panias, H. (3945/0)	פאניס, ח' (3945/0)	0	3945	3945/0
11	4	4	3	795600	267300	795200	266800	Mivzar Nimrod (4007/0)	מבצר נמרוד (4007/0)	0	4007	4007/0
11	4	4	3	764300	245300	762300	244400	Nahal `Amud (north) (29563/0)	נחל עמוד (צפון) (29563/0)	0	29563	29563/0
10	3	4	3	751000	211000	749000	210000	Afeq, T. (2425/0)	אפק, תל (2425/0)	0	2425	2425/0
10	3	4	3	766600	221200	766500	221000	Mezudat Yehi`am (Unofficial name) (2899/0)	מצודת גדין (2899/0)	0	2899	2899/0
10	3	4	3	772200	221600	772100	221400	Montfort (2901/0)	מונפור (2901/0)	0	2901	2901/0
10	2	5	3	634000	223700	629600	221300	Jerusalem, Old City (2921/0)	ירושלים, העיר העתיקה (2921/0)	0	2921	2921/0
10	3	4	3	749000	227000	748000	226000	Yodefatz (3040/0)	יודפת (3040/0)	0	3040	3040/0



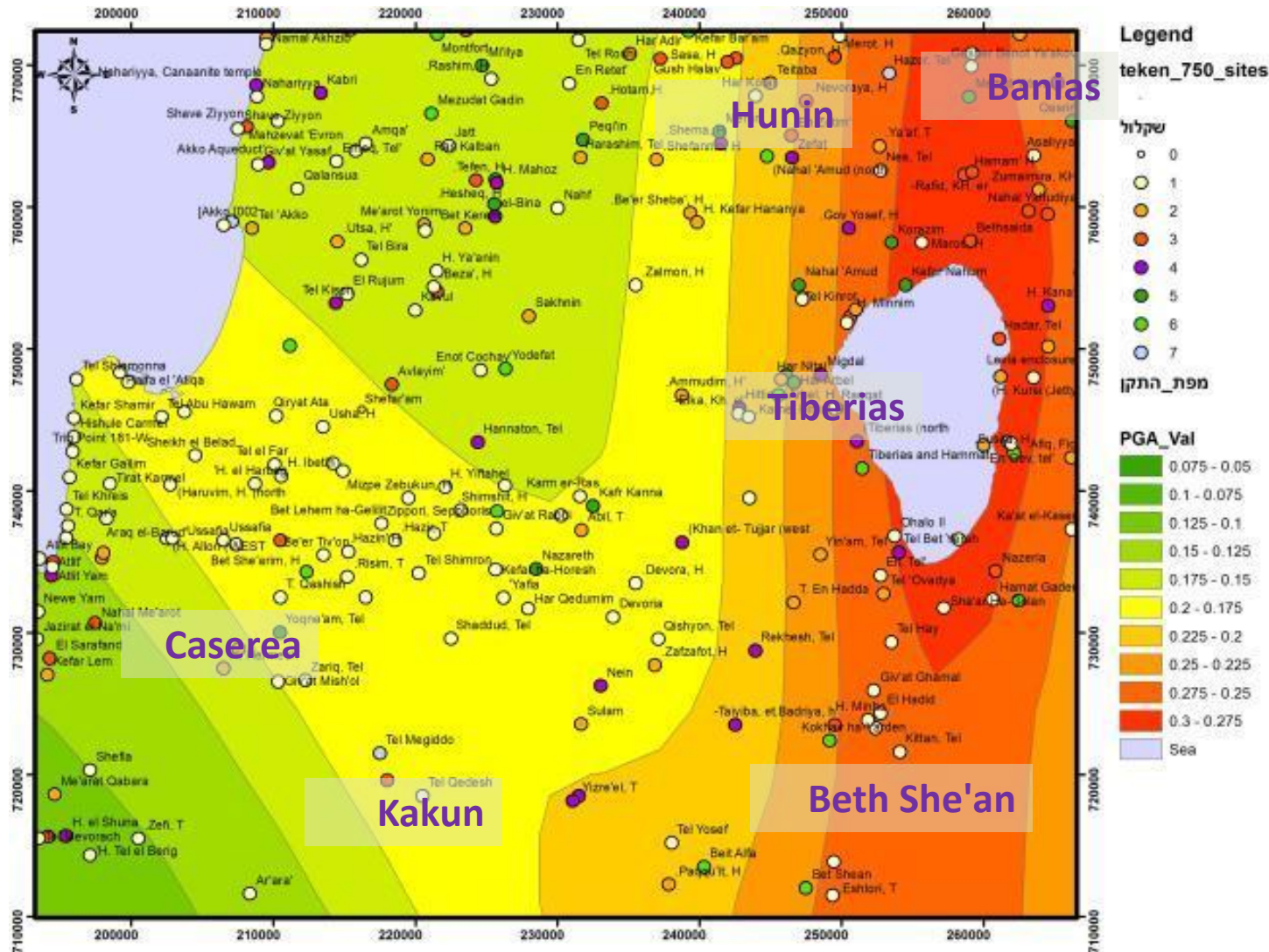
# Selected sites

(Based on the 750 sites list)

Location

Height

Location



# Earthquake and Archaeological Sites

## Development Risk Assessment Model

**VULNERABILITY**

**X**

**HAZARD**

**= RISK**

Engineering and Physical  
conservation state

Faults  
Topography amplification  
Slope stability  
Liquidity  
Tsunami

***Critical (450 - )***

***High (300-450)***

***Medium (150-300)***

***Low (0-150)***

## Training





# Risk Evaluation

Risk Map - Structure Card										
Date										
Site										
Name of the Building/complex										
Reference										
Site serial number										
Fill duration in minutes										
Type of the edifice remains	Structure, Complex, Part of complex, Colonnade									
Materials	not calculated									
Mortar	Concrete, Basalt, Lime stone, Sand stone, Other									
Technology	Lime, Cement, Mud, Epoxy									
Integrity	One leaf, two leaves, three leafs, colonnade									
Elevation	3D connections									
Height (absolute)	0	3	2	1	Multiplicity					
Engineering and conservation state	0	3	2	1	Automatic					
Collapse	0	4	3	2	1	yes ----- no				Existence of collapse that endanger the Structure
Dismantled	0	4	3	2	1	yes ----- no				Existence of dismantling of structural element that endanger the Structure
3D connections	0	4	3	2	1	yes ----- no				No existence of 3D connections of structural element that stabilize the Structure
Vaults arches	0	4	3	2	1	yes ----- no				No exist
Deformations	0	4	3	2	1	yes ----- no				Existen
Verticals or Horizontal Cracks	0	4	3	2	1	yes ----- no				Existen
Adjacent constructions	0	4	3	2	1	yes ----- no				Adjace
Modern intervention	0	4	3	2	1	yes ----- no				Modern
Physical- conservation state	0	4	3	2	1	Automatic				
Lacking bricks/blocks/mortar/element	0	4	3	2	1	yes ----- no				Lacking
Deterioration	0	4	3	2	1	yes ----- no				Deterio
Vegetation	0	4	3	2	1	yes ----- no				Vegeta
Vulnerability	0	Automatic								
Conclusion										
General conclusion										
Detail Conclusion										
Recommendation										
General										
Details										
Free words										
Hazard										
Faults	1	4	3	2	1					
Topography Amplification	0	4	3	2	1					
Slope stability	1	4	3	2	1					
Liquidation	0	4	3	2	1					
Tsunami	0	4	3	2	1					
Dangers	Automatic									
Risk Score	Automatic									
Critic	Endang									
High	Active									
Medium	Bad co									
Stable	Stable Condition									
Engineer Applicant										
Geological App'l car,t										
Appendix										





## Engineering and conservation state

	No	-	Yes	Σ	
instability of constructive elements which endanger the structure	1	2	3	4	0
Lack of constructive elements which endanger the Structure (beam/ vault/ arch/ pillar)	1	2	3	4	0
Lack of 3D connections between constructive elements (foundations / walls/ roof/ ceiling/ columns )	1	2	3	4	0
Slenderness (the proportion between the tall and wide) 1) 1: 4 / 2) 1:6 / 3) 1:8 / 4) 1:10	1	2	3	4	0
Existence of deformation (sinks, blows, attitude) that can endanger the stability of the structure	1	2	3	4	0
Existence of vertical / horizontal / diagonal constructive cracks that endanger the stability of the structure	1	2	3	4	0
Adjacent construction that endanger the structure	1	2	3	4	0
Modern intervention that endanger the stability of the structure	1	2	3	4	0
	Total				0

## Physical - conservation state

Lacking bricks/blocks/mortar/element	Lacking of elements the endanger the structure	1	2	3	4	0
Deterioration	Deterioration that endanger the structure in the short term	1	2	3	4	0
Vegetation	Vegetation that endanger the stabilizing of the structure	1	2	3	4	0
		Total				0



Engineering and conservation state

instability of constructive elements which endanger the structure

Lack of co

Lack of 3D

Slenderne

Existence

Existence  
structure

Adjacent c

Modern in

Physical

Lacking br

Deteriorat

Vegetatio



No - Yes Σ

1 2 3 4 0

1 2 3 4 0

1 2 3 4 0

1 2 3 4 0

1 2 3 4 0

1 2 3 4 0

1 2 3 4 0

1 2 3 4 0

Total 0

1 2 3 4 0

1 2 3 4 0

1 2 3 4 0

Total 0

Engineering and conservation state

	No	-	Yes	Σ	
instability of constructive elements which endanger the structure	1	2	3	4	0
Lack of constructive elements which endanger the Structure (beam/ vault/ arch/ pillar)	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	Total				0
	1	2	3	4	0
	1	2	3	4	0
Total				0	



Engineering and conservation state

	No	-	Yes	Σ	
instability of constructive elements which endanger the structure	1	2	3	4	0
Lack of constructive elements which endanger the Structure (beam/ vault/ arch/ pillar)	1	2	3	4	0
Lack of 3D connections between constructive elements (foundations / walls/ roof/ ceiling/ columns )	1	2	3	4	0
Slenderness (the proportion between the tall and wide) 1) 1: 4 / 2) 1:6 / 3) 1:8 / 4) 1:10	1	2	3	4	0
Existence of deformation (sinks, blows, attitude) that can endanger the stability of the structure	1	2	3	4	0
Existence of vertical / horizontal / diagonal constructive cracks in the structure	1	2	3	4	0
Adjacent construction that endanger the structure	1	2	3	4	0
Modern intervention that endanger the stability of the structure	1	2	3	4	0
	Total				0

Physical - conservation state

Lacking bricks/blocks/mortar/element	Lacking of elements		1	2	3	4	0
Deterioration	Deterioration that endangers the structure	Short term	1	2	3	4	0
Vegetation	Vegetation that endangers the structure	Structure	1	2	3	4	0
			Total				0





Engineering and conservation state

	No	-	Yes	Σ	
instability of constructive elements which endanger the structure	1	2	3	4	0
Lack of constructive elements which endanger the Structure (beam/ vault/ arch / pillars)	1	2	3	4	0
Lack of 3D connections between constructive elements (foundations / walls/ roof)					
Slenderness (the proportion between the tall and wide) 1) 1: 4 / 2) 1:6 /					
Existence of deformation (sinks, blows, attitude) that can endanger the stability					
Existence of vertical / horizontal / diagonal constructive cracks that endanger the structure					
Adjacent construction that endanger the structure					
Modern intervention that endanger the stability of the structure					

Physical - conservation state

Lacking bricks/blocks/mortar/element	Lacking of elements the endanger the
Deterioration	Deterioration that endanger the stru
Vegetation	Vegetation that endanger the stabiliz



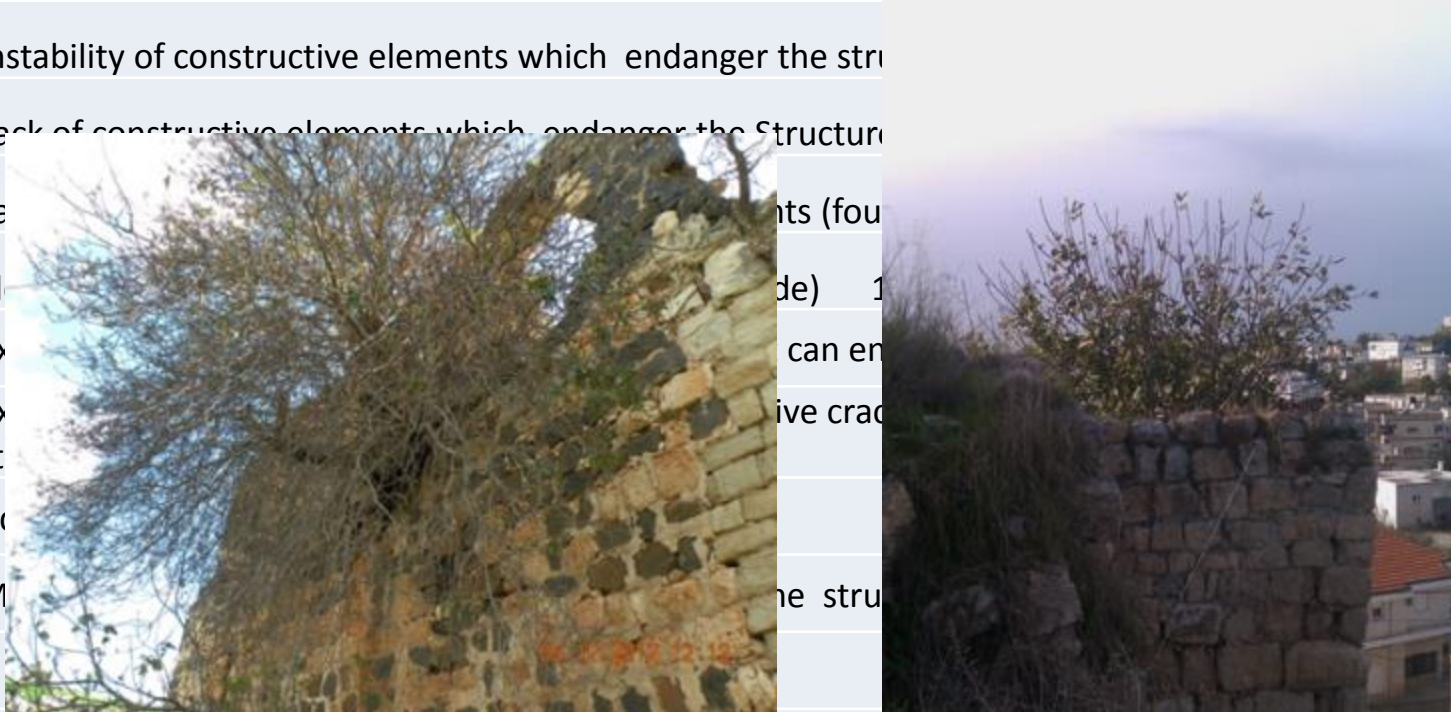
Engineering and conservation state

	No	-	Yes	Σ	
instability of constructive elements which endanger the structure	1	2	3	4	0
Lack of constructive elements which endanger the Structure (beam/ vault/ arch/ pillar)	1	2	3	4	0
Lack of 3D connections between constructive elements (foundations / walls/ roof/ ceiling/ columns )	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	1	2	3	4	0
	Total				0

Physical - conservation state

Lacking bricks/blocks/mortar/element	Lacking of elements the endanger the structure	1	2	3	4	0
Deterioration	Deterioration that endanger the structure in the short term	1	2	3	4	0
Vegetation	Vegetation that endanger the stabilizing of the structure	1	2	3	4	0
		Total				0

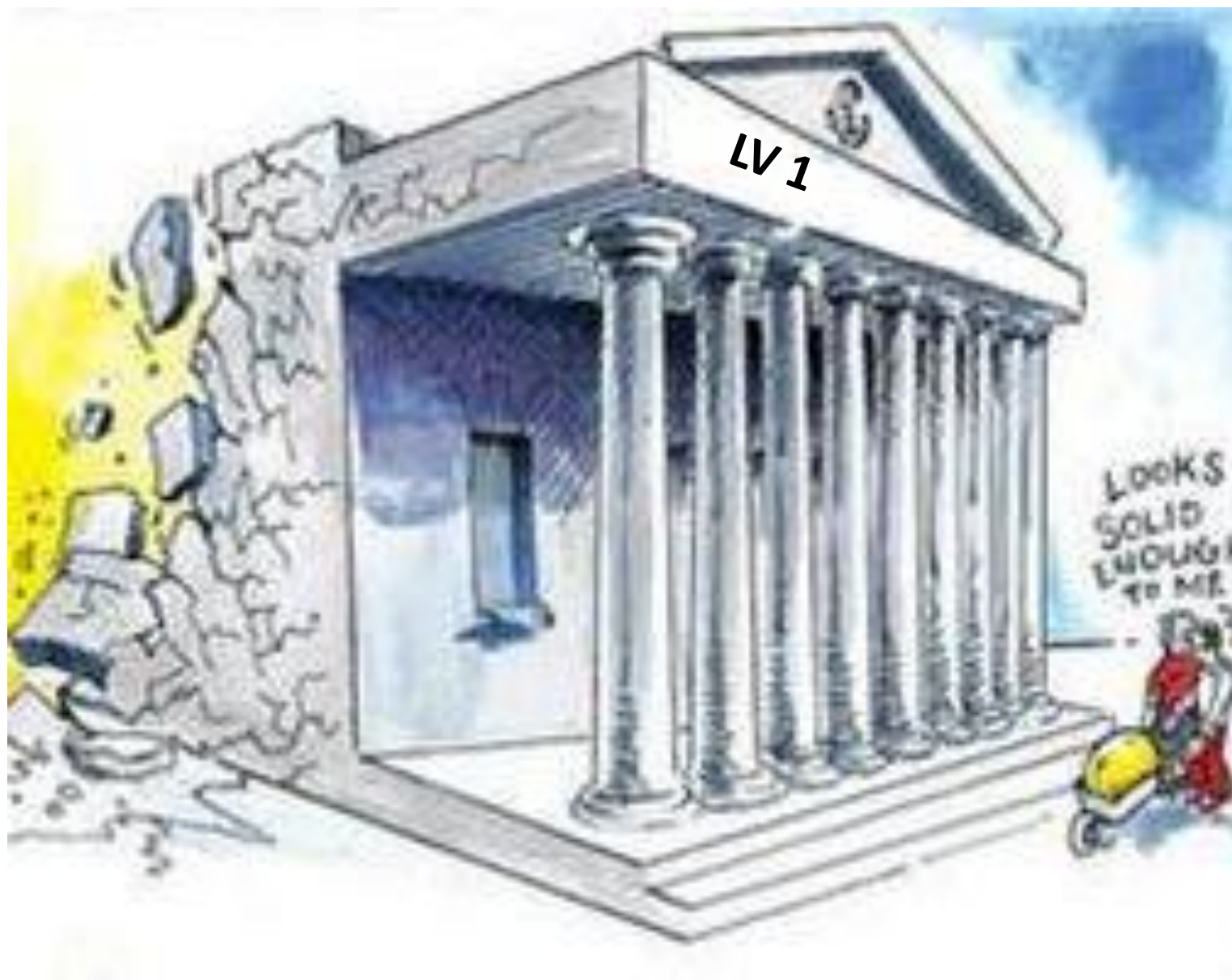
Engineering and conservation state

		No - Yes				Σ
	instability of constructive elements which endanger the structure	1	2	3	4	0
	Lack of constructive elements which endanger the Structure	1	2	3	4	0
	Lack of constructive elements (foundations)	1	2	3	4	0
	Slippage (side)	1	2	3	4	0
	Exposure to wind can endanger the structure	1	2	3	4	0
	Exposure to water and moisture can endanger the structure	1	2	3	4	0
	Accumulation of debris on the structure	1	2	3	4	0
	Total					0

Physical - conservation state

Lacking bricks/blocks/mortar/element	Lacking of elements the endanger the structure	1	2	3	4	0
Deterioration	Deterioration that endanger the structure in the short term	1	2	3	4	0
Vegetation	Vegetation that endanger the stabilizing of the structure	1	2	3	4	0
	Total					0





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# Risk assessment of cultural heritage assets - archaeological sites

This form is for entering risk assessment surveys. The data collected common pool that contains the details of all sites surveyed. After completing the form, please click on the button 'submit' and .wait for confirmation sending data

**Required \***

**\* Instability of the constructive elements that endanger the structure**

	4	3	2	1	
Yes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	No

**\* Date**

The lack of constructive elements endangering the structure (happens, / vault / wall / arch /  
**\* (pillar**

	4	3	2	1	
Yes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	No

**\* Site Name**

Lack of connection spatial (3D) constructive elements allows the stability of the structure  
**\* ((elements / walls / columns / roof / ceiling**

	4	3	2	1	
Yes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	No

**\* Name of structure / assembly**

**Ref X**

X

**\* (Slenderness (ratio of height to width**  
up to 1:4, 2 - 1:6, 3 - 1:8, 4 - 1:10 and up - 1

	4	3	2	1	
and up 1:10	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Up to 1:4








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










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












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A















































































































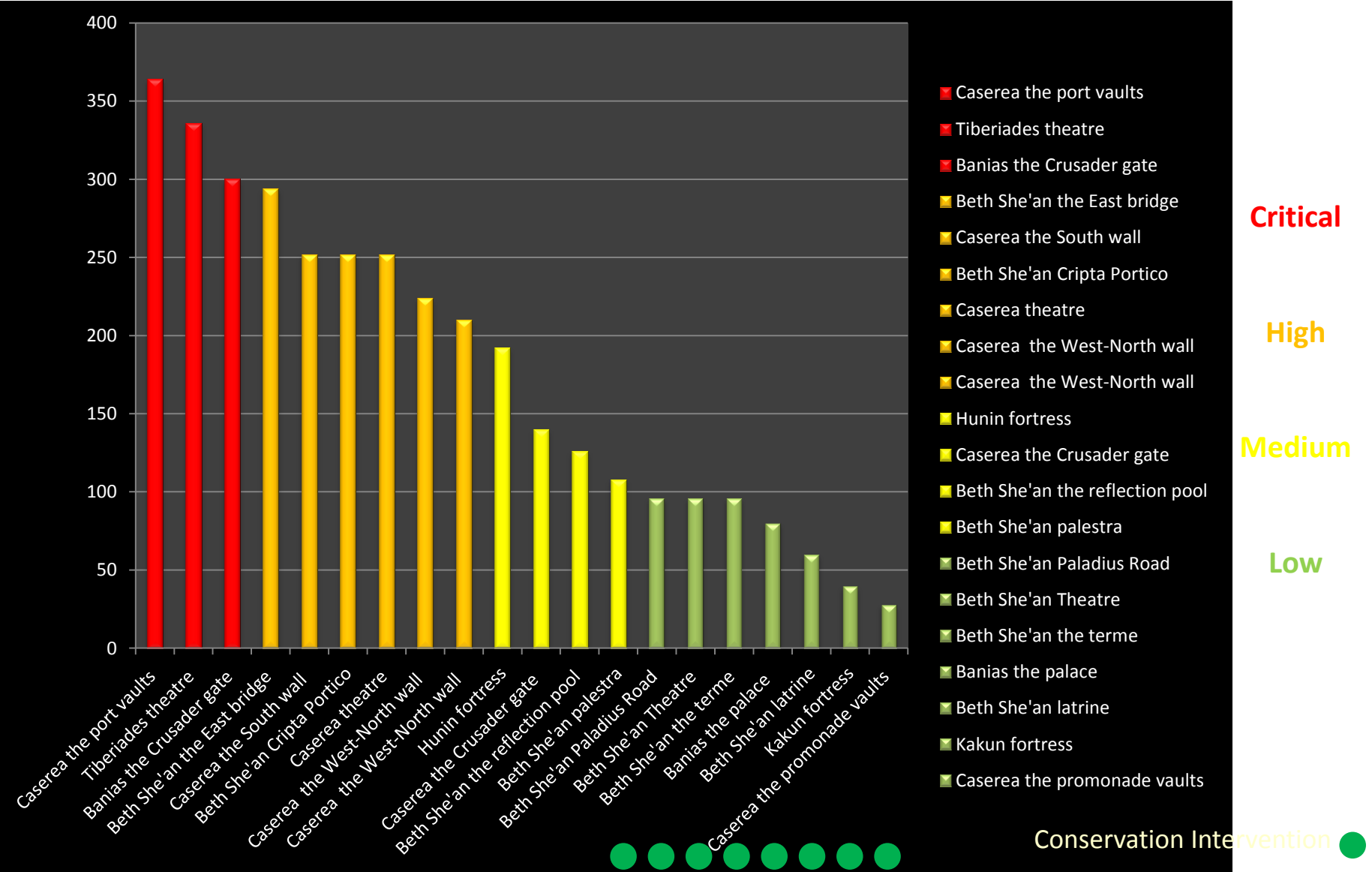

 $f_x$  | Timestamp

	J	I	H	G	F	E	D	C	B	A	
	סוג המבנה - מבנה/ חלק ממכלול/ מכלול/ שדרת עמודים/ אחר	זמן הערכה ומילוי הטופס, בדקות	שמות: מהנדס/ משמר	מספר רץ אתר (סקר)	נ"צ Y	נ"צ X	תאריך	שם מבנה/מכלול	שם האתר	Timestamp	
מעל 4 מטר	test	14	test				6.6.12	test	test	18/10/2012 21:12:34	2
מעל 4 מטר	test	14	test				18.10.12	test	test	18/10/2012 21:31:34	3
מעל 2 מטר	מכלול	6	יעקב שפר וגבריאל סולומון	1	182020	677640	11/06/2012	חפיר העיר - בדרום מזרח	אפולוניה - תל ארשף	11/11/2012 12:12:57	4
מעל 2 מטר	מכלול	8	יעקב שפר וגבריאל סולומון	2	181942	677703	11/06/2012	וילה רומית	אפולוניה - תל ארשף	11/11/2012 12:25:56	5
											6
מעל 4 מטר	חומה דרומית	10 דקות	יעקוב שפר וגבריאל סולומון	1.3	768021	181939	06/11/2012	מצודה- חומות דרומיות	אפולוניה - תל ארשף	19/11/2012 11:20:38	
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מעל 4 מטר	אחר חומה מזרחית	10 דקות	יעקוב שפר וגבריאל סולומון	1.4	678031	181963	06/11/2012	מבצר צלבני חומה מזרחית	אפולוניה - תל ארשף	19/11/2012 11:41:23	8
מעל 4 מטר	חומה צפונית	10 דקות	יעקוב שפר וגבריאל סולומון	1.5	678060	181949	06/11/2012	מבצר צלבני חומה צפונית	אפולוניה - תל ארשף	19/11/2012 11:47:04	9
								מצודה צלבנית ושער			

Sheet1 ▾

Timestamp

# Preliminary Risk Assessment results of Archaeological Sites - Pilot (2010-1)

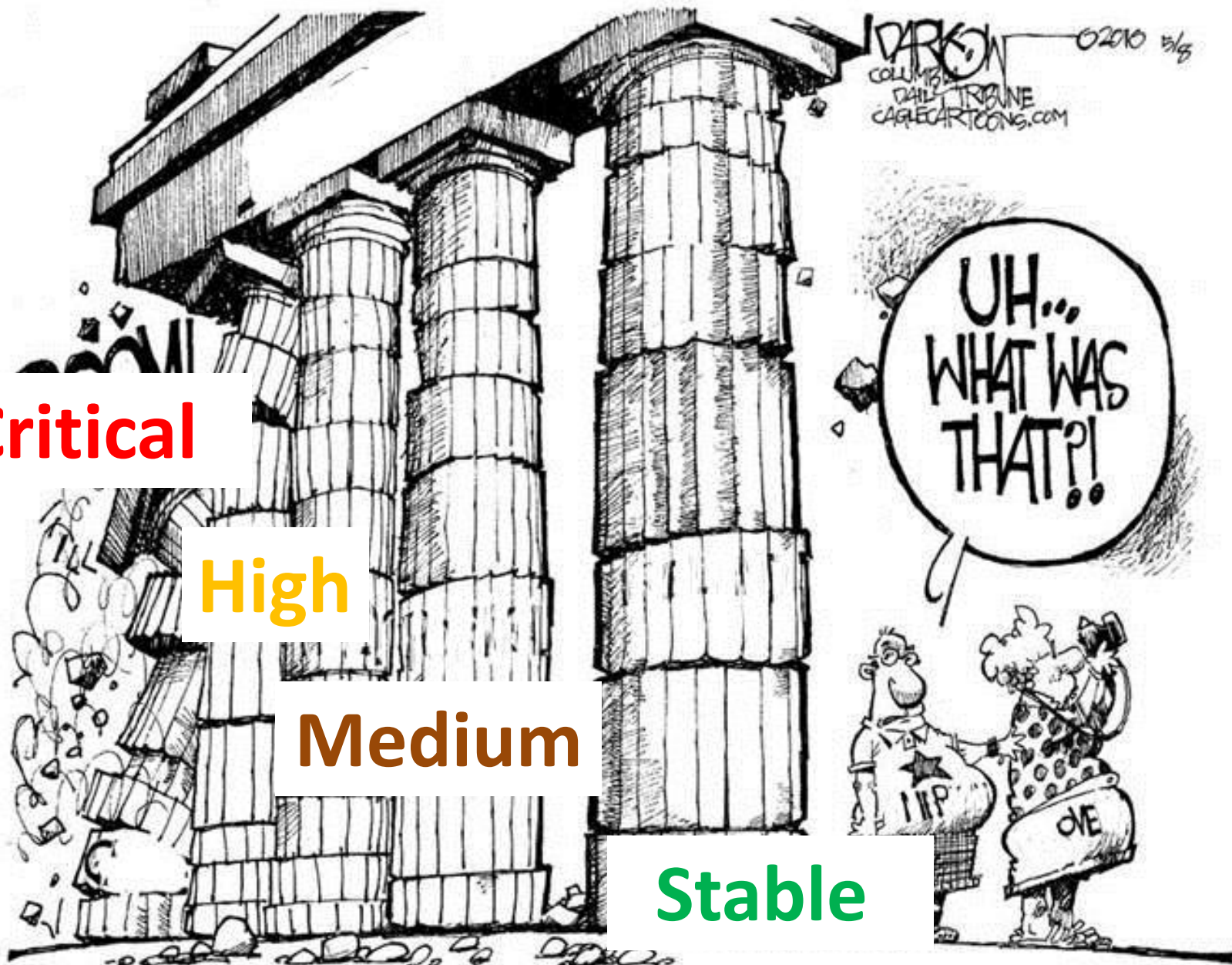


Critical

High

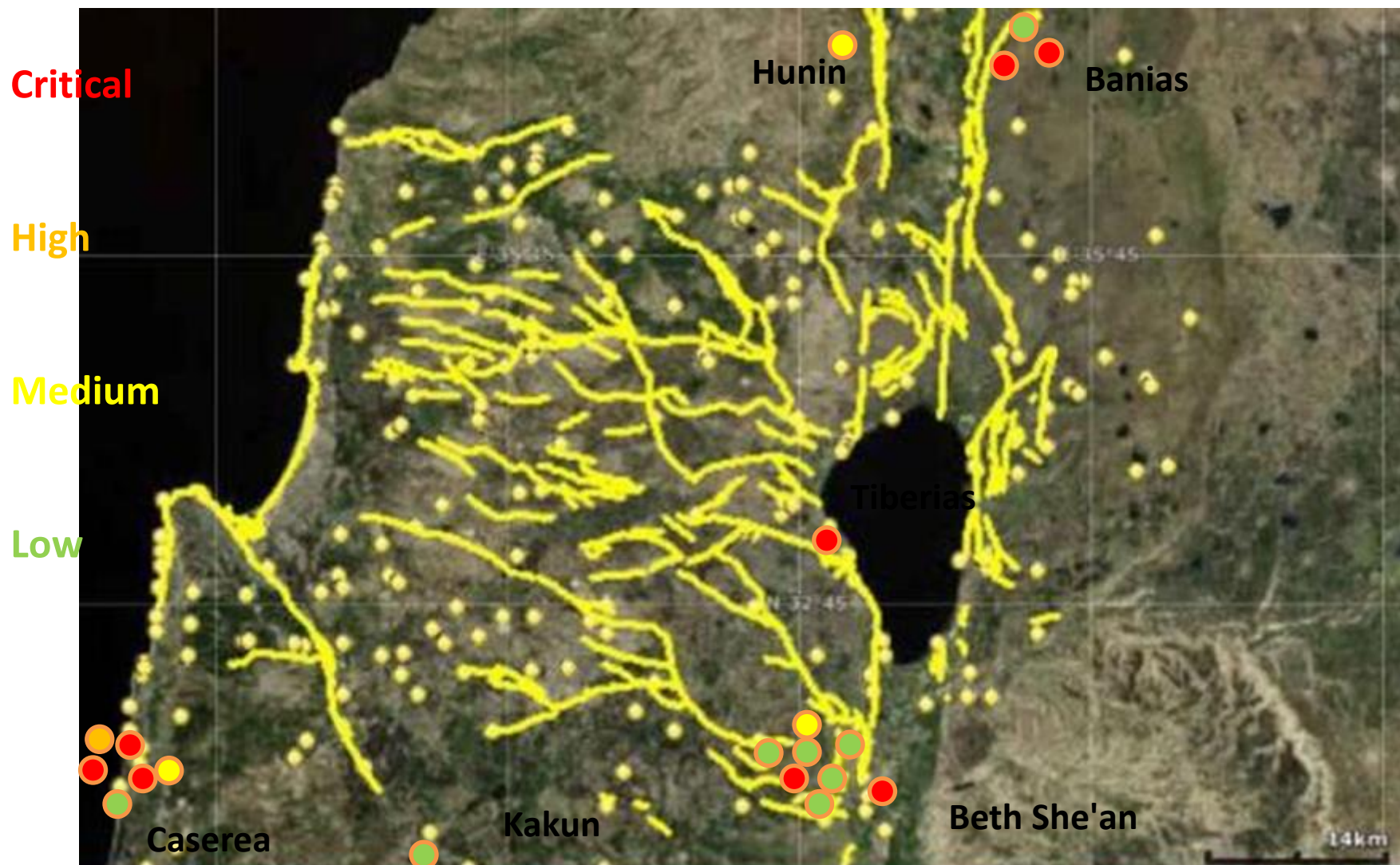
Medium

Stable





## Preliminary pilot results – risk assessment of CH structures



# First remarks

- Feasibility of simple model for Risk map
- The results based on knowledge give validity
- There is lack of risk preparedness in managed sites, some of their monuments are in high or critical state
- Structures that were submitted to conservation are usually in good state

2011/12/22 15:2



# Thinkable solutions for Risk Preparedness

- Sharing information (GIS)
- Alarm / monitoring systems
- Reinforcing / strengthening
- Closing / isolating structures / places
- Evacuation routes
- Guideline procedures
- Training professionals
- Supplementary investigations







on Park,  
on Mauleverer with Hopperton  
ered Park and Garden Grade II,  
9 LBs  
ally unsatisfactory  
major localised problems  
m  
ing  
e, multiple owners

Mid C19 terraced gardens which provide the setting for a country house, surrounded by parkland which was enlarged in the 1720s and reworked in the 1770s. C20 woodland planting has significantly changed the character of the historic landscape and a number of listed structures are in poor condition.

**Afek**

Contact: Andy Wimble 01904 601970



on Castle,  
on with Warthermarske  
ered Park and Garden Grade II\*,  
LBs  
ally satisfactory  
with significant localised problems  
m  
ing  
e, single owner

Gardens and extensive pleasure grounds with grottos, rustic bridges and rockwork laid out from 1796 to c1820 under the direction of Adam Mickel the second and others for Sir William Danby, incorporating lakes and landscaping of c1760. The park probably has C17 or earlier origins. Significant proportion of the tree cover has reached maturity and beyond, some structures in poor condition and water bodies in Quarry Gill woods heavily silted.

**Apollonia**

Contact: Andy Wimble 01904 601970



of Boroughbridge,  
ghbridge / Langthorpe / Milby  
ered Battlefield  
ally satisfactory  
with significant localised problems  
m  
ing  
e

Thomas Earl of Lancaster's 1322 revolt against Edward II ended with defeat as his army attempted to retreat north and cross the River Ure. Much of the battlefield lies under modern Boroughbridge; further expansion is possible north of the river.

**Beth Guvrin**

Contact: Keith Emerick 01904 601988

**PRIORITY (FOR BUILDINGS)**

- A Immediate risk of further rapid deterioration or loss of fabric; no solution agreed.
- B Immediate risk of further rapid deterioration or loss of fabric; solution agreed but not yet implemented.
- C Slow decay; no solution agreed.

- D Slow decay; solution agreed but not yet implemented.
- E Under repair or in fair to good repair; but no user identified; or under threat of vacancy with no obvious new user (applicable only to buildings capable of beneficial use).

- F Repair scheme in progress and (where applicable) end use or user identified; functionally redundant buildings with new use agreed but not yet implemented.

**NOTE:**  
If the priority category has changed since the 2010 register, the previous category is given in brackets.

**ABBREVIATIONS**

- CA Conservation Area
- LB/LBs Listed Building/s
- LPA Local Planning Authority
- NP National Park
- RPG Registered Park and Garden
- SM/SMs Scheduled Monument/s
- UA Unitary Authority
- WHS World Heritage Site





# Appropriate development



Beth She'an's theatre



Thank You

