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PREPAREDNESS FOR CLIMATE CHANGE

**A Study to Assess the Future Impact of Climatic Changes upon the
Frequency and Severity of Disasters and the Implications for Humanitarian
Response and Preparedness**

**Document prepared by
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in cooperation
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“The most immediate threats to humankind relate to increased variability in the intensity and frequency of storms and other extreme weather- and climate-related events such as floods and droughts, heat waves in major urban areas and the impact of sea-level rise on low-lying coastal regions”

- Professor Obasi, Secretary General, World Meteorological Organization, 23 March 2003

Executive summary

- **Weather-related disasters are increasing:** affecting 2.5 billion people and inflicting more than US\$ 400 billion of damage over the past decade. These figures reflect an alarming rise in vulnerability to extreme weather events.
- **Climate change is already happening and it's here to stay:** It is very likely that the global mean surface temperature in the 20th century has risen by about 0,6 °C. The 1990s was the warmest decade, and 1998 was the warmest year on record. This century is expected to see warming quicker than at any time in the past 10,000 years, the modern history of humankind.
- **Climate change will have a variety of impacts:** it is likely to lead to a rise in sea level, more droughts, floods, heat waves, water shortages, and increased threats to human health.
- **Climate change will hit the poor hardest:** climate change will disproportionately affect developing countries, and poor people within all countries.
- **Impacts will be unpredictable:** a country may be hit by drought one year and floods the next. Every government and National Society should assess the range of risks and plan to reduce vulnerability accordingly.
- **Precautionary principle:** a key element of the 1992 UN climate change convention is that a lack of scientific certainty is not an excuse for inaction.

- **Adaptation is essential:** we cannot prevent climate change altogether so we must adapt. That means integrating risk reduction strategies into humanitarian and development strategies.
- **Seven steps for reducing risk:** adapting to climate change requires a particular focus on disaster risk reduction. Only preparing to respond to disaster is not enough. The seven steps towards risk reduction are: carry out climate risk assessment, assess priorities and plan follow-up, raise awareness, establish and enhance partnerships, highlight vulnerability with other actors, document and share experiences, shape global response through advocacy.
- **National Societies can make a major contribution to global efforts:** All four core areas of the Federation Strategy 2010 - disaster preparedness, disaster response, health and care in the community, and principles and humanitarian values – are critical elements of the response to weather and climate related disasters. The global network of volunteers working with communities on the frontline of disaster enables the International Federation to inject a humanitarian dimension into global development policy. And the mandate for relief, development and health care enables the Federation to integrate disaster risk reduction across multiple sectors.
- **Act now** – in partnership with the world's most vulnerable people, so that they do not suffer the consequences of inaction.

Introduction

The 27th International Conference of the Red Cross and Red Crescent of 1999 adopted the following decision in its Plan of Action: *"The International Federation, while drawing upon existing research and the competence of relevant international bodies, will undertake a study to assess the future impact of climatic changes upon the frequency and severity of disasters and the implications for humanitarian response and preparedness."*

The International Federation was assisted in the preparation of the study by the Centre on Climate Change and Disaster Preparedness, the Hague, Netherlands. In June 2002, the Netherlands Red Cross established this Centre to raise awareness, develop risk reduction policy and programs in relation to climate change and disaster preparedness. The Third Assessment Report (TAR) of the Intergovernmental Panel on Climate Change (IPCC) - Climate change 2001 provides the most comprehensive assessment of the current scientific knowledge on climate change. It was therefore decided that the report would, rather than include a separate study on future impact of climatic changes upon disasters, present a summary analysis of the Third Assessment Report, especially Working Group II, Impact, Adaptation and Vulnerability, which has particular relevance for disaster response and preparedness.

This study will also be issued as a publication by the Climate centre, enlarged with a number of annexes with material from the IPCC report and experiences from the first field studies conducted by the Climate Centre in five locations. This study will be reviewed by the International Federation Governance as part of the preparatory work for the International Conference.

1 The future impact of climatic changes upon the frequency and severity of disasters

1.1 Scientific consensus

The scientific consensus on climate change is presented in the reports of the Intergovernmental Panel on Climate Change (IPCC), which was established in 1988 by the United Nation's Environment programme (UNEP) and the World Meteorological Organization (WMO). The IPCC engages hundreds of the world's leading experts to review the published literature on the scientific and technical aspects of climate change. This section summarizes those findings of the IPCC's most recent comprehensive survey¹, The Third Assessment Report (TAR) – Climate change 2001, especially the Working Group II, Impact, Adaptation and Vulnerability, which has particular relevance for disaster response and preparedness.

¹ IPCC Third Assessment Report (TAR): Climate Change 2001.

In the rest of this chapter, all descriptions of climate change (historical observations and future projections) are drawn from the IPCC TAR Synthesis Report, unless other references are provided.

The IPCC Synthesis Report's Summary for Policymakers provides a comprehensive overview of the IPCC's findings (in just over 30 pages). For the full reports, and further information, please refer to www.ipcc.ch.

Climate change is already happening

Global average surface temperatures rose by about 0.6 °C during the 20th century – the greatest rise of the past 1,000 years. The five warmest years on record have all occurred since 1995². Rainfall over land has increased by 5-10% in the Northern hemisphere, while other regions have seen less rain (e.g. north and west Africa and parts of the Mediterranean). In parts of Asia and Africa, the frequency and intensity of droughts have increased in recent decades.

Climate change is largely caused by humans

According to the IPCC: "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities".

Climate change is here to stay

The IPCC has made various projections for the climate in the coming century, based on different socio-economic scenarios. But whatever the scenario, climate change is here to stay. The global mean surface temperature is projected to increase by 1.4-5.8°C by 2100 – a rate of warming that's very likely without precedent during at least the last 10,000 years. This projected temperature increase is likely to lead to both increases and decreases in rainfall, depending on the region. The average sea level is projected to rise by between 0.09 and 0.88 m, with significant regional variations. The IPCC also projects an increase in climate variability and changes in the frequency, intensity and duration of extreme events, such as more hot days, heat waves, heavy rainfall and fewer cold days. These changes would lead to increased risks of floods and droughts in many regions.

Current studies also suggest that peak wind and precipitation intensity of tropical cyclones are likely to increase over some areas.

Impacts will hit the world's poor hardest

A warmer world will have positive and negative effects. But the bigger the changes, the more negative the effects will be. Broadly speaking, heavier rains in regions that already attract precipitation, and more drought in drier, mid-continental regions. Water shortages are projected to worsen in many water scarce areas of the world, and threats to human health are likely to increase, particularly in tropical/subtropical countries. Direct health impacts will be caused by heat stress and death or injury in floods and storms. Other threats will arise indirectly, through changes in the range of disease vectors (e.g. mosquitoes), and decreases in water quality, air quality and food security.

The impacts of climate change will fall disproportionately upon developing countries and poor persons within all countries. This in turn will exacerbate existing inequities in health status and access to adequate food, clean water, and other resources. Millions of people on small islands and along low-lying coastal areas are at particular risk from sea level rise and storm surges.

² World Meteorological Organization, June 2003

1.2 What can be done?

Climate change and its impacts can be lessened by reducing emissions of 'greenhouse gases' (e.g. CO₂ and methane). In 1992, the UN Framework Convention on Climate Change (UNFCCC) was established to try and stabilize greenhouse gas concentrations sufficiently to "prevent dangerous anthropogenic interference with the climate system"³. One key element is the *precautionary principle* – in the face of severe climate-related risks, a lack of complete scientific certainty cannot be an excuse for inaction to address the problem. As scientific evidence for climate change grew stronger during the 1990s, parties to the UNFCCC created the Kyoto Protocol, which includes mandatory reductions of greenhouse gas emissions for developed countries. The Protocol is currently close to ratification⁴.

However, *projected* climate change and its effects cannot be prevented entirely.⁵ The IPCC scientists therefore advise a combined strategy of reducing greenhouse gas emissions and adaptation to the impacts of climate change⁶. *Adaptation* can reduce the adverse effects of climate change and produce additional benefits. Three international funds have been established that could fund adaptation in developing countries, but only one is currently operational. In practice, adaptation will work best if it is integrated into policies, which deal with current climate-related risks, in the context of ongoing sustainable development and disaster risk reduction⁷.

2 Implications for humanitarian response and preparedness

Since 1999, when the 27th International Conference of Red Cross and Red Crescent decided to study climate change in relation to humanitarian response and preparedness, scientific concerns about climate change have increased, as expressed in the IPCC Third Assessment Report 2001, and weather-related disasters have continued to soar.

³ In other words, to prevent greenhouse gas emissions from human activities affecting the climate system in such a way that it would have dangerous consequences.

⁴ It requires the signature of at least 55 parties to the UNFCCC, including Annex 1 countries (more developed countries which have to meet emissions reduction targets) accounting for at least 55% of the 1990 emissions of all Annex 1 countries together. As of September 2003, 84 countries had signed the Protocol and 117 had ratified or acceded to it.

⁵ The greater the reductions in emissions and the earlier they are introduced, the smaller and slower the projected warming and the rise in sea levels. However, given the emissions that have already taken place, neither a reduction of greenhouse gas emissions, nor even stabilization of their concentrations in the atmosphere at a low level, will altogether prevent climate change and sea-level rise, or their impacts.

⁶ IPCC TAR Synthesis Report, 2001, summary for policymakers: "*Adaptation is a necessary strategy at all scales to complement climate change mitigation efforts*"

⁷ See also Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation, June 2003, World Bank et al, www.worldbank.org/povcc

The growing concerns about climate change come against the backdrop of a worrying rise in the vulnerability to natural disasters. The past few decades have seen a reduction in the number of people killed by natural disasters (probably at least in part due to better disaster preparedness⁸), but a dramatic increase in the number of people affected and economic

	1970s	1980s	1990s	1993-2002
Number of reported disasters	1,110	1,987	2,742	2,935
Number reported killed	1.96m	800,000	790,000	531,000
Number reported affected	740m	1.45bn	1.96bn	2.5bn
Amount of disaster damage (US\$)	131bn	204bn	629bn	655bn

Note: Over the past decade, weather-related disasters accounted for 90% of all reported natural disasters, 86% of all deaths from natural disasters, 99% of all those affected by natural disasters and 63% of damage caused by natural disasters. Sources: World Disasters Report, 2002 and 2003

and socio-economic losses. Last year alone, over 600 million people were affected by hydro-meteorological disasters – triple the decade's average⁹. This rise in losses and people affected reflects a growing vulnerability to natural hazards, and in particular to weather- and climate-related hazards, which dominate the disaster statistics¹⁰. This growing vulnerability is intimately tied to development patterns: environmentally unsound practices, global environmental changes, population growth, urbanization, social injustice, poverty, and short-term economic vision are producing vulnerable societies¹¹. While climate change may already be playing a role¹², the key origin of rising disaster losses is increasing vulnerability. The projected trends in extreme events and additional uncertainties associated with climate change will compound these risks and make the challenge of reducing them more urgent yet at the same time more difficult.

Climate change will directly affect the work of many governments and National Societies. While some impacts can be projected fairly accurately, many others will only become apparent once climate change progresses. In their work with disaster preparedness and response, National Societies and other humanitarian organizations are dealing with risks on a daily basis. Climate change not only raises the risks, but also increases the uncertainties.

⁸ World Disasters Report 2002

⁹ World Disasters Report 2003

¹⁰ Ibidem

¹¹ Living with Risk: A global review of disaster risk reduction initiatives, Preliminary version, UNISDR, Geneva 2002

¹² IPCC Third Assessment Synthesis Report, 2001

A country may be hit by a once-a-century flood this year, and by a heat wave or drought the next. A 'well-prepared' organisation will be aware that the range of extreme events may be growing, and will enhance its strategies to reduce people's vulnerability to such events. For some practical risk reduction options see below Box 1.

Box 1 Practical risk reduction options

Much of the Red Cross and Red Crescent Societies work in disaster preparedness and response already focuses on the effects of weather-related disasters. Climate change is likely to change the range, severity and frequency of such hazards. Hence it acts as an additional incentive for the Federation to expand current programmes. However, rather than only preparing to respond to the impacts of disasters, the Federation must strive to reduce the vulnerability of the world's poorest and most exposed people. A sample of relevant Red Cross Red Crescent experiences in risk reduction that are relevant to changing climate risks includes:

- Community based disaster preparedness and mitigation programmes, based on community vulnerability and capacity assessment (VCA – International Federation methodological tool).
- Supporting the design and construction of community shelters, elevated food and seeds storage and stronger homes in areas prone to flooding and windstorms (India, Bangladesh and Vietnam).
- Promoting community's construction of flood platforms, simple earth mounds, providing safe elevated areas for people and livestock (South Asia).
- Local coping mechanisms: (Solomon Islands, Sudan)
- Designing and improving evacuation routes and sites (South East Asia and Ethiopia).
- Improving simple early warning and evacuation systems along flood-prone rivers, in combination with awareness about local knowledge (South and South East Asia, Central America).
- Promoting the extension of famine early warning systems to the community and household level (Africa).
- Reinforcing riverbanks, along with irrigation canal refurbishment to prevent water loss (Dushanbe, Tajikistan)
- Construction of erosion gabions along flood-prone rivers (Ethiopia, Nepal, Lesotho).
- Terracing strategies to prevent landslides and soil erosion, along with water trapping for drought/flood prone areas (Ethiopia)
- Supporting rainwater harvesting programmes and spring water protection projects in drought-prone areas (East Africa).
- Regular cleaning-up of sites where disease vectors are abundant, such as stagnant or polluted water (Syria, Sudan).
- Mangrove conservation and replanting programmes along coastlines, generally in cooperation with other agencies (Vietnam)
- Community based programmes in coastal areas to raise awareness of heat-related illness due to increasingly warm weather (South Asia).
- Supporting community seed bank development, in which local communities build up a safety buffer ready to face shortages during expected or recurrent droughts (Kenya, Uganda, Ethiopia, Central America).

Adapting to climate change requires a particular focus on disaster risk reduction. Some risks can be predicted and planned for accordingly as part of ongoing disaster preparedness and health and care programmes. But specific impacts will not be uniform across the globe, so each organisation must assess those risks in partnership with national and regional experts (e.g. institutes for meteorology and hydrology).

In some places, climate change impacts may appear to be less important than other issues facing the country and its National Society. Sub-Saharan Africa, for example, is gripped by the devastating HIV/AIDS pandemic, which clearly requires priority attention. Yet, as the experience of the 2000-03 food crisis has shown, climatic hazards – such as drought – combine with poverty and disease and other vulnerabilities to create a compound disaster which can only be solved through an integrated approach.

It is important that disaster preparedness and health programmes pay attention to local knowledge about trends in risks and vulnerabilities. Older people remember how weather patterns have changed over the years, which developments may have left the community more vulnerable and which coping mechanisms have worked best. National Societies' volunteer networks and the community-based nature of Vulnerability and

Capacity Assessments make the International Federation well qualified to carry out such dialogue.

The global threats posed by climate change are discussed further below in relation to the four core areas of the International Federation's Strategy 2010.

- **Promotion of humanitarian values**

Extreme weather events hit hardest when they compound other development problems that reduce the coping capacity of those affected. The poorest, the most socially or economically marginalized, the weakest and most ill are also those people most vulnerable to the impacts of climate change. Upholding the principle of *humanity* – which seeks to "prevent and alleviate human suffering" and to "protect life and health" – may become even more of a challenge as the effects of climate change take hold.

- **Disaster response**

All over the world, extreme weather events may become more frequent, intense and long-lasting – which in turn may lead to more disasters. Climate scientists project a widespread increase in the risk of flooding for tens of millions of people due to heavier rainfall and sea level rise¹³. Droughts, heat waves, and other weather-related extremes are likely to further stretch the disaster response capacities of National Societies.

- **Disaster preparedness**

The key strategy in dealing with the uncertainties of climate change is to enhance existing activities, which minimize current disaster risks. This means two things: improving the disaster preparedness efforts of governments, the National Societies and other humanitarian organizations and integrating disaster risk reduction into development strategies. Misguided development is increasing people's vulnerability to extreme weather events, through for example: poor land use (building on floodplains or unstable slopes), deforestation, uncontrolled population growth and urbanization, social injustice, poverty and economic short-termism. The International Federation also has a role to convince other development actors of the need to integrate disaster risk reduction in their programmes.

Some projected impacts of climate change are sufficiently certain to warrant proactive risk reduction measures now. For example, mountain glaciers and icecaps are melting across the world, with major implications for the communities who live downstream. In the Himalayas, the risks posed by Glacial Lake Outburst Floods (GLOFs) must be planned for and reduced. Equally, governments and National Societies operating in small island states and along low lying coastlines must plan now for the effects of sea level rise. Coastal zones need to be protected from erosion and storm surges. The mangrove reforestation project by Red Cross volunteers in Viet Nam for example, protect coastal dykes from the destructive power of high waves, saving lives and improving livelihoods.

¹³ IPCC TAR, Working Group II: Impacts, Adaptation and Vulnerability, Summary for Policymakers

At the same time, reducing people's vulnerability to drought by investing in rainwater harvesting or improving the use of early warning systems could be part of the long-term strategy for regions such as southern Africa and central and south Asia. A five years drought across northern India affected 300 million people last year – climate change may make such disasters more frequent and more severe.

- **Health and care in the community**

As many parts of the world are likely to get warmer, disease-bearing mosquitoes and tsetse flies may increase their range, spreading malaria, dengue, and leishmaniasis¹⁴. Robert T. Watson, formerly Chair of the IPCC, warned that: "Projected changes in climate could lead to an increase in the number of people at risk of malaria of the order of tens of millions annually"¹⁵. More flooding will increase the risk of water-borne diseases such as cholera, dysentery and hookworm. Countries already suffering health and sanitation problems will be hit hardest by these changes. Meanwhile, heat waves will result in additional heat stress mortality, and increases in droughts and extreme events would add to stresses on water resources and flood security.

3 Way forward: seven steps towards better risk reduction

In order to start reducing the risks associated with climate change, action needs to be taken now by all actors including governments, international organisations, the business community and NGO's. The International Federation, through the National Societies, can make a great contribution to these efforts, particularly in the core areas of Strategy 2010. In particular, this study recommends the following seven steps in risk reduction.

(i) Preliminary climate risk assessment

Governments and National Societies (particularly those in high-risk areas) should make a preliminary assessment of the projected impacts of climate change and the implications for their role and activities. This assessment needs to include both scientific inputs and community consultations, to learn whether local people perceive any changes in risk and to assess how a changing climate would affect everyday lives. An assessment of climate change-related risks could form part of a broader Vulnerability and Capacity Assessment (VCA).

(ii) Assess priorities and plan follow-up

In some cases, the conclusion of the risk assessment may be that climate change is not yet a priority issue. In other countries however, such an assessment could raise important concerns that would need to be prioritized. Follow-up activities could be initiated by the government with the National Society and in partnership with other national or regional organizations.

¹⁴ IPCC TAR Working Group II, Impacts, Adaptation and Vulnerability, Chapter 9 (Human Health)

¹⁵ Presentation at the Sixth Conference of Parties to the United Nations Framework Convention on Climate Change , November 13, 2000

(iii) Raise awareness

The preliminary climate risk assessment should lead to a programme to raise awareness about climate change and possible impacts on vulnerable people. If climate change is identified as a priority, the next step would be to integrate climate change into ongoing education activities with local communities. In the National Society context, this could be done through First Aid programmes, Community-based disaster preparedness and risk reduction, Health and Care in the Community, or during VCAs (Vulnerability and Capacity Assessments).

(iv) Establish and enhance partnerships

The preliminary climate risk assessment will involve various experts (scientists, meteorologists etc.). It is advised that these contacts are maintained and strengthened, to provide updates on future impacts of climate change and possible adaptation strategies. Equally, scientific organizations could learn from the International Federation's and National Societies' field experience of disaster risk reduction. The National Societies' contact with communities and households puts them in a strong position to help bridge the gaps between national and local actors.

(v) Highlight climate-related vulnerability with other actors

People's vulnerability to climate change needs to be kept on the agenda during the regular dialogue between National Societies and governments and other actors. This could involve injecting a humanitarian perspective into development issues such as: the management of coastal zones and natural resources, policy development for heat waves in urban areas, or land-use planning in flood-prone areas. By raising such concerns, National Societies could also help integrate disaster risk reduction into development strategies.

(vi) Document and share experiences and information

The impacts of climate change are in many cases uncertain and unpredictable. Governments and National Societies across the world will have to relate to the "thousand faces" of climate change and find innovative approaches to deal with new uncertainties. It will be important to learn from each others' experiences of assessing and responding to climate-related risks. Lessons in disaster preparedness and risk reduction should be documented and shared between National Societies, within the International Federation and with other organizations involved in adapting to climate change.

(vii) Advocacy: shape the global response to climate change

Climate change is a global issue with local impacts. The International Federation is a global organization with local branches. In other words: the issue fits the structure of the organization. As the world's largest humanitarian network, the International Federation is uniquely placed to relate the vulnerabilities and capacities of exposed communities to the wider arena of international humanitarian and development policy. This makes the International Federation potentially a key player in contributing to the local, national, regional and international responses to climate change.

We must bring the concerns and experiences of vulnerable people in the face of climate change to the attention of policy makers, both within the Federation and in other relevant international fora, including the United Nations' Framework Convention on Climate Change (UNFCCC). We also have a responsibility to call on all governments to address the problem driving climate change – the emission of greenhouse gases.

4 Conclusions

According to IPCC, our climate will warm in a way not seen for at least 10,000 years – the entirety of modern human history. This threatens if unchecked – to destabilize the world's weather systems with adverse consequences for society and undermining the very foundations of sustainable development. Weather-related disasters are on the increase - affecting two and a half billion people and inflicting over US\$ 400 billion dollars of damage in the past decade alone¹⁶.

The worst droughts in living memory have recently afflicted south and central Asia. Disease and drought claim millions of African lives each year. Throughout 2003, floods have brought havoc in China, Sri Lanka and the Himalayas. In the US, tornadoes reached record numbers in May, while Europe sweltered under a heat wave for much of the summer. We cannot say these disasters are definitely caused by climate change. But we can say that such disasters are consistent with a warmer and more unstable global climate. As the world warms up, such disasters will become more frequent, more severe and more long-lasting and affect more vulnerable people across the globe. According to the World Meteorological Organization: "New record extreme events occur every year somewhere in the globe, but in recent years the number of such extremes has been increasing." For many, climate change remains a remote risk. But it has the potential to act as a negative catalyst – exaggerating the effects of disasters we see taking place today, from extreme events such as windstorms, droughts and floods to more chronic crises such as coastal erosion, disease, crop failure and parched or polluted water sources. Whatever the effects, it will be the world's poorest who suffer most.

The threats posed by climate change cut across many different sectors – humanitarian aid, development, health, livelihoods. Yet few countries or donors have succeeded in adapting their programmes to these threats in a way that integrates disaster response, sustainable development, vulnerability and poverty reduction. Effective response to the challenges identified in this study will require action by everyone, from governments, the business sector as well as all members of the humanitarian and development community. The International Federation, as an organization, which spans all these sectors, is ideally positioned to advocate for and to pursue a policy of reducing the risks of weather-related disasters across all its programmes.

We have a choice: to ignore the warning signs, to argue environmental issues fall outside our humanitarian mandate, to stick to business-as-usual. Or to take precautions now, to assume the worst and start planning for it, to act in partnership with governments, the business sector and with the world's most vulnerable people – so that they don't suffer the consequences of our inaction.

¹⁶ World Disasters Report 2003

References:

- International Federation, Strategy 2010
International Federation, World Disasters Report 2002
International Federation, World Disasters Report 2003
IPCC, *Third Assessment Report (TAR) - Climate Change 2001*
IPCC, *Third Assessment Report, 2001, Summary for Policymakers*
IPCC, *Third Assessment Report, Working Group II, Impacts, Adaptation and Vulnerability, Summary for Policymakers*
IPCC, *Third Assessment Report, Working Group II, Impacts, Adaptation and Vulnerability, chapter 9 (Human Health)*
Robert T. Watson, Chair of the IPCC, Presentation at the Sixth Conference of the parties to the UN Framework Convention on Climate Change, 13 November 2000
UN ISDR, *Living with Risk: A global review of disaster risk reduction initiatives*, Preliminary version, Geneva 2002
World Bank et al, *Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation*, June 2003

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